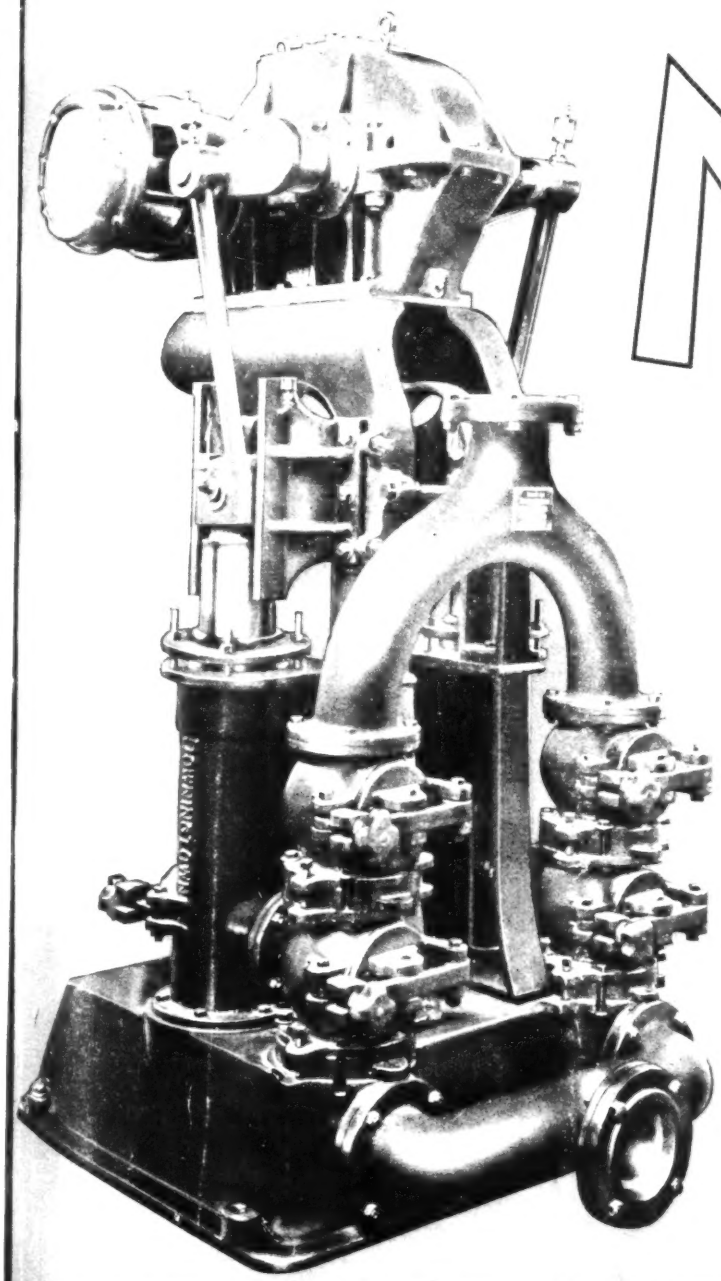
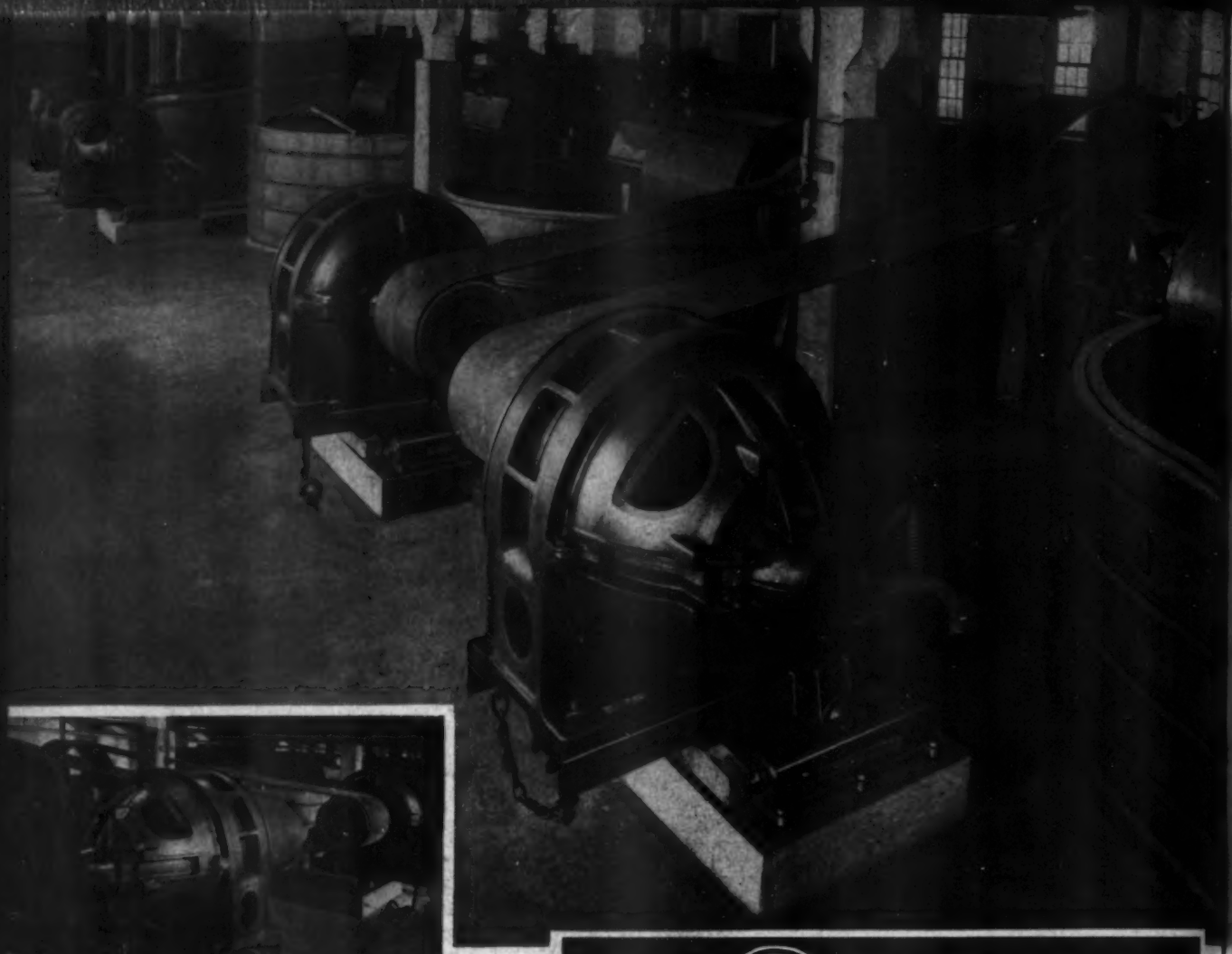
THE PAPER INDUSTRY
and PAPER WORLD
AN EDUCATIONAL NEWS MAGAZINE — JULY, 1938

NEW



Modernized design of the old reliable plunger pump eliminates tight and loose pulleys, belts, exposed gears and saves power, minimizes noise and reduces upkeep costs. Open gears replaced by herringbone speed reducer, running in oil, with built-in motor. Pump can be set up anywhere, for it is a complete, self-contained unit. Cranks mounted on double, extended slow speed shaft. Select a size large enough to do your work at 25 revs. or less and you can feel assured of a trouble-free pump of which you can feel proud. The Downingtown Manufacturing Co., Downingtown, Pa.

BUILDERS OF MACHINERY FOR PAPER AND BOARD MILLS



Here are three unusually good photographs of the Rockwood PIVOTED-MOTOR *Short Center Drives on six beaters of the Rogers Paper Company, Goodyear, Connecticut. Your beater belt drives are never a problem when you install Rockwood Drives. They operate with scarcely any attention; you save maintenance, power and belts—and beater performance is definitely improved. Rockwood Bases are equally beneficial with V-belt drives. V-belt life frequently is doubled and replacement of the V-belts also may be cut in half.*

ROCKWOOD PIVOTED MOTOR DRIVE

Beaters do more work *at less co*

These pictures of six beaters equipped with Rockwood Drives at the Rogers Pa Co. mill show a modern and exceptionally good looking beater room. Note how a desired part of the weight of the motor can be used; first to establish and then fore after automatically to maintain—just the right belt tension to handle the maxim beater load. That means minimum belt tension and minimum belt wear—minim bearing pressure and minimum friction loss every day the drive is in service. Belt st is automatically taken up. Electrical torque reaction of the motor further tightens belt when the load increases and slacks it when the load decreases. *Thus the dri pulley speed is maintained uniform, regardless of change in belt length,* and maxim machine output always results from minimum power input. Belt life is about do that of idler drives. Savings in power, belt life and maintenance should pay for complete drive within the first year. Installation is easy and simple. Existing dr can be changed over quickly. Each installation is guaranteed by Rockwood to be s factory or your money will be cheerfully refunded. LET US HEAR FROM Y ABOUT *YOUR* DRIVES. You undoubtedly have some beaters, Jordans, fan pumps that need improving. We will be glad to make recommendations.

Rockwood Manufacturing Company, Indianapolis, In

Rockwood Drives are reducing maintenance, savi

power and improving performance wherever

Suctionize

YOUR BOARD MACHINE WITH Beloit SUCTION

DRUM PRESS *
PRIMARY PRESS
MAIN PRESS

Note the short top felt for suction drum press nip. All plain primaries have been removed.

Wet pickup felt returns after suction primary press. Suction first press is on separate felt.

1. Removes large quantity water without disturbing formation or finish.
2. Reduces crushing and checking.
3. Improves finish. Reduces felt marks.
4. Permits use of light weight short top felt. Lower felt cost.
5. Eliminates several nips. Improves test of board.
6. Permits more bulk if desired.
7. Increases test or permits cheaper furnish and maintain same test.
8. Suction main press more efficient on separate felt.

* Suction drum press is equivalent to suction drum and suction primary press.

BELOIT IRON WORKS PAPER MACH BELOIT WIS.

THE BELOIT WAY IS THE MODERN WAY

BELOIT IRON WORKS, BELOIT, WIS.

WHY THE ROTOCURE PROCESS OF PRODUCES

HE BWH Rotocure Process of Continuous Vulcanization is the only practical method of producing uniform rubber belting entirely free from press overlaps. It solves the problem because the belting is processed on an exclusive patented rotary type of press, radical in principle. It substitutes uniformity for variation by making the vulcanizing process automatic instead of spasmodic. Uniformity results not from the skill or experience of the operator, but from the unvarying precision of the machine. The result: a uniform belt uniformly vulcanized and uniformly stretched, that will give uniform service.

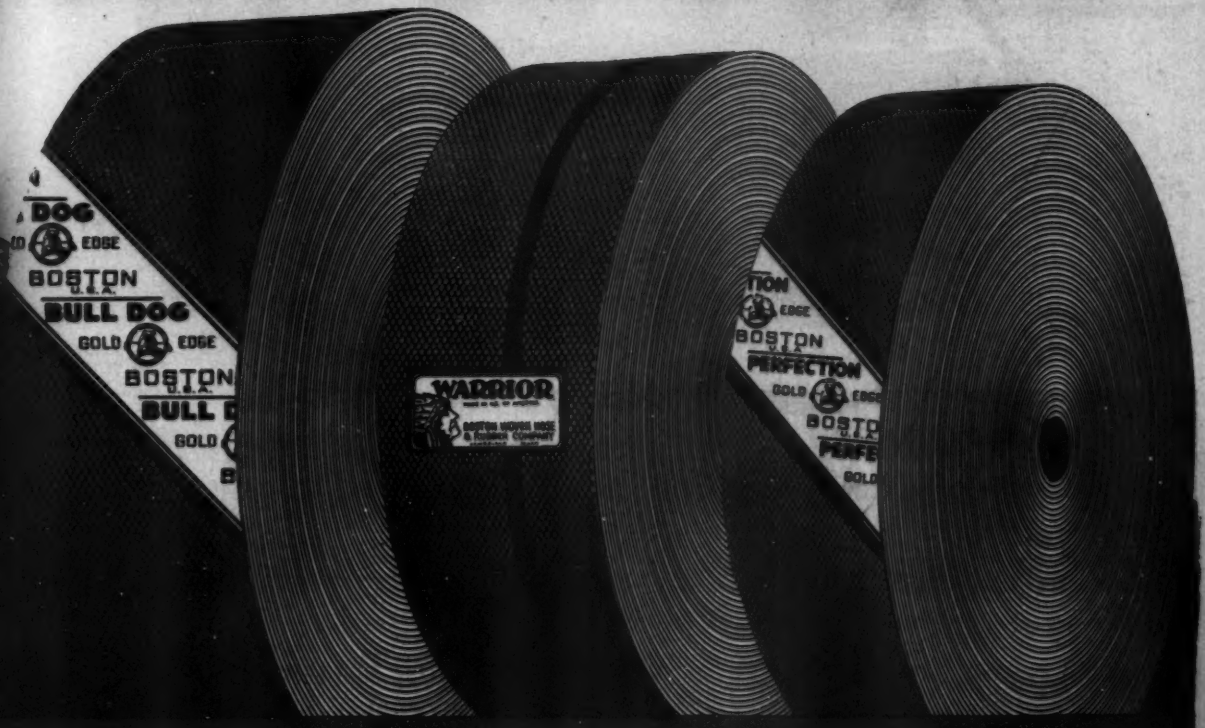
The advantages of continuously vulcanized belts and the economy which they represent in the operation of your plant cost you nothing. BWH belts, made by this process, are competitive in price. You pay no premium for this extra measure of quality and service. It is only necessary to order belting by name and specify the BWH brand which best suits your service requirements.

BOSTON WOVEN HOSE AND RUBBER COMPANY

BOSTON WOVEN HOSE

CONTINUOUS

BETTER BELTS



BULL DOG

For the severest requirements of drive and endurance. Extreme and uniform flexibility to meet difficult driving conditions. The gold standard of belt value. No drive too hard. No service too severe.

WARRIOR

Built of special 32-oz. duck, folded construction highly resistant to stress and strain, and with high quality friction between the plies. For hard general use where sturdy and consistent performance is required.

PERFECTION

Built on a proved principle — many plies of relatively light-weight duck instead of a few plies of heavy duck. Widely used in the lumber industry on woodworking machinery; also for motor fan and centrifugal pump drives.

The above belts are made in all standard widths and any number of plies to meet specified conditions. Made endless if desired.

RUBBER COMPANY CAMBRIDGE MASS. U.S.A.

50 Years
Of Experience
Qualifies Seybold
For Leadership

SEYBOLD *Precision*
Automatic Clamp Ream Trimmer

Trim and Cut.. at Lower Cost
with a Seybold–Precision in Design and Construction

Sales and Service Departments:

New York: E. P. Lawson Co., Inc.
426-438 W. 33rd Street

Chicago: Chas. N. Stevens Co., Inc.
110-116 W. Harrison Street

Atlanta: J. H. Schroeter & Bro., Inc.

San Francisco, Los Angeles, Seattle:
Harry W. Brintnall Co.

Dayton: Seybold Factory

Toronto, Montreal:
Harris-Seybold-Potter
(Canada) Limited

London, England: Smyth-Horne, Ltd.

Latin America and West Indies:
National Paper and Type Co., Inc.

The progress and development of Seybold Paper Cutting machines has kept pace with the trend for modernization and development of high speed automatic machinery. The Seybold PRECISION Automatic Clamp Ream Trimmer is an outstanding example of Seybold engineering and manufacturing leadership. This Seybold is a precision built mill trimmer, the type and kind of precision machine that you instinctively know only Seybold would and could build with a background of fifty years, doing the kind of accurate cutting which leaves nothing to be desired by the mill.

★ *Other Products by SEYBOLD . . .*

Book Compressors
Book Trimmers
Cutting Machines
Drilling Machines
Knife Grinders
Punching Machines
Die Presses
Round Corner Cutters
Stamping Presses
Wire Stitchers

SEYBOLD DIVISION • HARRIS • SEYBOLD • POTTER COMPANY
D A Y T O N , O H I O

THE PAPER INDUSTRY and PAPER WORLD

VOLUME 20 NUMBER 4 JULY, 1938

— ARTICLES —

Water: A Raw Material for the Paper Industry, Part II—Boiler Feed ..... *R. T. Sheen and H. M. Wilson* 403

A High School Course in Papermaking ..... *Edward N. Whittington* 409

Evaluating Beating Equipment Efficiency ..... *H. D. Cook* 412

Cellulose Research, 1933-37. A Resume, Part I—Molecular Weight of Cellulose ..... *Louis Elsberg Wise, Ph.D.* 413

Convention Papers . . . Abstracted 438

— NEWS —

Trade Winds 369
Associations 417
Governmental 466
Safety 470
Allied 472
Forestry 481
Other Countries 482
Potpourri 484
Personals 486
Necrology 488

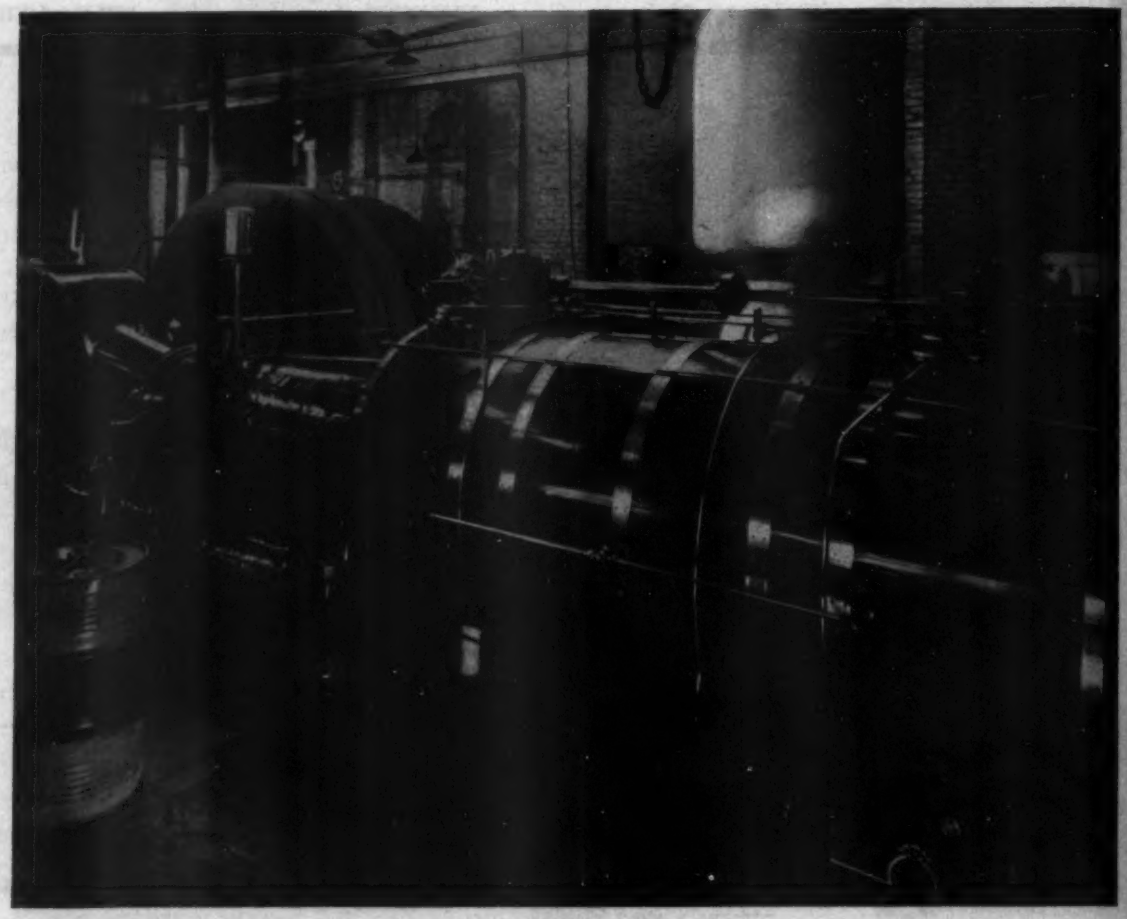
— DEPARTMENTS —

Editorial 393
Current Thought 394
Paper Sketches 411
New Equipment and Supplies 464
Papermaking Patents 468
Safety Contest Scores 471
New Publications 476
Technical Developments 478
Current Market Quotations 492
Index to Advertisers 495

EDWARD B. FRITZ, Publisher
HARRY E. WESTON, Editorial Director
BESSE MERRITHEW, Editor
A. SCOTT DOWD, Advertising Manager
EDGAR C. FARREN, Production Manager

Published monthly, on the tenth of the month, by THE FRITZ PUBLICATIONS, 220 N. Michigan Ave., Chicago, Ill. Eastern Office: 9 Rockefeller Plaza, New York, N. Y.; L. D. SCHNABEL, Manager. Pacific Coast Office: 1031 S. Broadway, Los Angeles, Calif. THE PAPER INDUSTRY and PAPER WORLD is a member of the Audit Bureau of Circulations and The Associated Business Papers, Inc. Entered as second class matter June 20, 1938, at the post office at Chicago, Illinois, under the Act of March 3, 1879. Subscriptions in the United States, $2.00 for one year and $3.00 for two years. Canada, $2.50 per year. Foreign, $3.00 per year. Copyrighted 1938 by Edward B. Fritz, Publisher.

Clean STEAM



This Skinner Uniflow Engine is giving excellent performance daily and keeps notably free from wear. It has been on Texaco Steam Cylinder Oil for years.

TEXACO

FOR PROCESSING!

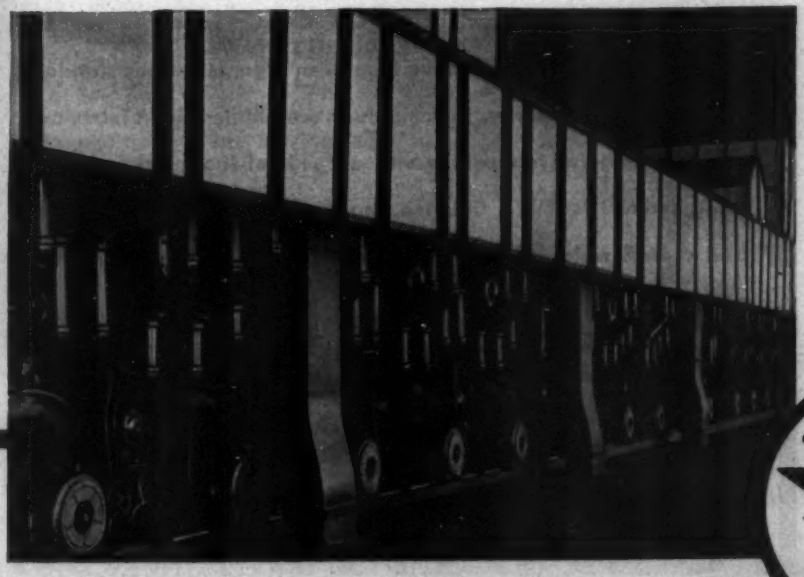
YOU CAN OVERCOME THE DIFFICULTY of cylinder oil in exhaust steam, especially where used in processing, heating dryer rolls, etc., by using Texaco Steam Cylinder Oils. While these oils atomize quickly and completely, they separate readily from exhaust steam.

Make sure your process steam is clean.

There are 14 different Texaco Steam Cylinder Oils. Properly selected for specific conditions, they reduce wear, prevent groaning, save interruptions.

Trained lubrication engineers are available for consultation on the selection and application of Texaco Steam Cylinder Oils. Prompt deliveries assured through 2108 warehouse plants throughout the United States. Call your nearest one, or write to—

The Texas Company, 135 East 42nd Street, New York City.



Heated by exhaust, dryer rolls retain high conductivity where Texaco Steam Cylinder Oils are used for your engine lubrication.

TEXACO

STEAM CYLINDER OIL

Through The Centuries With Alkalies

The first paper mill in this country was built in 1690 at Germantown, Pa. resulting from the needs of the Philadelphia printer William Bradford and the arrival of the German paper maker, William Rittenhouse. In paper making, soda ash and caustic soda have long played a prominent part. Bleaching thru the use of liquid chlorine, another alkali product, is largely responsible for the tremendous revolutionary advance in the use of wood pulp for paper manufacture.

COLUMBIA Soda Ash and COLUMBIA Caustic Soda are leading COLUMBIA products which have long been regarded as the standard of uniformity and purity. Both products are obtainable in forms and packages adapted to meet the varied needs of the many industries using soda. COLUMBIA Chlorine, too, is produced under conditions and control which assure the consumer full strength, purity and uniformity.

Information about any or all of COLUMBIA products on request.

COLUMBIA

SODA ASH
CAUSTIC SODA
SODIUM BICARBONATE
MODIFIED SODAS
LIQUID CHLORINE
CALCIUM CHLORIDE

THE COLUMBIA ALKALI CORPORATION
BARBERTON • OHIO

NEW YORK · ST. LOUIS · CLEVELAND · CHICAGO · PITTSBURGH · MINNEAPOLIS · BOSTON · CINCINNATI · PHILADELPHIA

SAVES 13% IN HORSEPOWER!

Mead Johnson & Co. Saves 13% in Horsepower by Replacing Out-Dated Pumps with an Improved, Modern Allis-Chalmers Pump. Find Out How Allis-Chalmers Pumps Can Cut Your Operating Costs . . . Can Pay for Themselves in the Dollars They Save!

THE PUMP THAT GAVE A SAVING OF 13% in Horsepower to Mead Johnson & Co. This 10" x 8" Type SH pump with synchronous motor drive, rated 2400 gpm, 105 ft. head, replaced two 6" pumps in the Evansville, Indiana, plant.

A saving in horsepower of 13%! Old pumps replaced by a modern design pump with improved efficiency! That's how Allis-Chalmers cuts operating costs . . . slashes overhead . . . leads the way to bigger profits!

In the pump room of Mead Johnson & Co., manufacturers of infants' foods, at Evansville, Indiana, were two 6" pumps—good pumps, but they were fifteen years old! They operated twenty-four hours a day, six days a week—but they were only 74% efficient! They still gave service—but a new pump could give the same amount of water for less money!

Mead Johnson & Co. consulted Allis-Chalmers. The two 6" pumps were replaced by a larger pump of modern design with 85% efficiency. And the resultant saving in horsepower amounted to 13%! The new pump actually paid for itself in savings in pumping costs. And it's going to keep on piling up savings for years to come!

15% More Water—With Allis-Chalmers Engineering!

If your pumps are more than ten years old, you can cut your pumping costs. Replace them with up-to-date, improved Allis-Chalmers Centrifugal pumps. You can get the savings that increased efficiencies offer. You can get as much as 15% more water for your money!

And that's only part of the story! You get engineering . . . testing . . . research . . . Allis-Chalmers facilities that insure the right pump for the right job! You get undivided responsibility for both pump and drive!

Find out how you can cash in . . . save dollars in pumping costs. Call the Allis-Chalmers representative near you. There's an Allis-Chalmers man . . . a trained pump engineer . . . who can get you more for your money . . . show you how to save dollars in pumping costs!

CENTRIFUGAL PUMP DIVISION

ALLIS-CHALMERS

MILWAUKEE · WISCONSIN

SINGLE STAGE DOUBLE SUCTION PUMPS • CLOSE COUPLED SINGLE STAGE SSUni PUMPS • MULTI-STAGE PUMPS • PAPER STOCK PUMPS • MIXED FLOW AND AXIAL FLOW PUMPS • AND SPECIAL DESIGNS FOR UNUSUAL APPLICATIONS

THE user-reports printed opposite are typical of a large number that have come in. What they all boil down to is this: Tellurium Lead is establishing itself as an "extra-service" lead—as a product of sound merit with the capacity to give longer service in many applications requiring the handling of corrosive liquors and gases.

Manufacturers in a position to know report that this lead gives increased resistance to sulphuric and other corrosive acids, even at temperatures that tend to approach the melting point of the metal. In plant after plant, it has prolonged the useful life of equipment...and reduced the number of shut-downs for repairs.

Another highly important property of Tellurium Lead is this: *It toughens under stress.* When rolled, stretched or hammered, it actually becomes stronger. As a result, turn-over points and joints are less subject to cracking. Furthermore, where vibration occurs, this capacity to develop latent strength minimizes buckling and creeping. This same quality also gives Tellurium Lead improved resistance to fracture due to repeated heat changes.

Tellurium Lead of our manufacture is St. Joe chemical lead alloyed with a small quantity of tellurium. It gives the advantages of this well-known chemical lead plus important new ones. Yet now, due to a price reduction, it costs only a fraction of a cent more per pound than chemical lead. Available in sheets, pipe and coils. For further facts, write to nearest branch.

• • •

NATIONAL LEAD COMPANY

New York, Baltimore, Buffalo, Chicago, Cleveland, Cincinnati, St. Louis; National-Boston Lead Co., Boston; John T. Lewis & Bros. Co., Philadelphia; National Lead & Oil Co., Pittsburgh; Georgia Lead Works, Atlanta; Gibson & Price Co., Cleveland; American Lead Corporation, Indianapolis; Master Metals, Inc., Cleveland; The Canada Metal Company, Ltd., Toronto, Montreal, Winnipeg, Vancouver.

★ "4 TO 5 TIMES LONGER SERVICE"

"1¼" x 6 lbs. Tellurium Lead coil is used in a bath of 10 to 20% sulphuric acid and water with a steam pressure of 5 to 15 lbs. and a temperature of 170° F. It replaced an open jet steam system which oxidized badly at the acid level. Tellurium Lead has not shown any signs of this action after four or five times the length of service of lead formerly used."

A leading manufacturer writes:

"I wish to say that your Tellurium Lead pipe has proven all you claimed. It is easy to weld and easy to flange. Also the flanges stand up a good deal better than ordinary lead as they seem to actually become stronger at the turn-over point."

"DOUBLE LIFE"

—reports this user

"Tellurium Lead coils used in a dilute sulphuric acid solution. The lead coils previously used gave comparatively short service (about 6 months). Tellurium Lead coils have been operating continuously 24 hours a day for one year and as yet no blow-outs have occurred nor have any repairs been necessary."

Expressing his complete satisfaction with Tellurium Lead, another manufacturer writes: "We can say that for the last two years we have purchased all our lead requirements in Tellurium Lead, since we find a considerable advantage in its stiffness and resistance to vibration crystallization. This lead has been used for pipe lines, tank linings and various acid-plant fittings, and we feel that it is well worth its additional cost."

No Twisting or Bulging...

A chemical plant used 2½" x 14 lb. Tellurium Lead pipe in a pump line carrying alum liquor. Former pipe twisted and bulged after three months' service. Tellurium Lead has been in service three years and is still performing satisfactorily.

New Low Price Now in Effect!

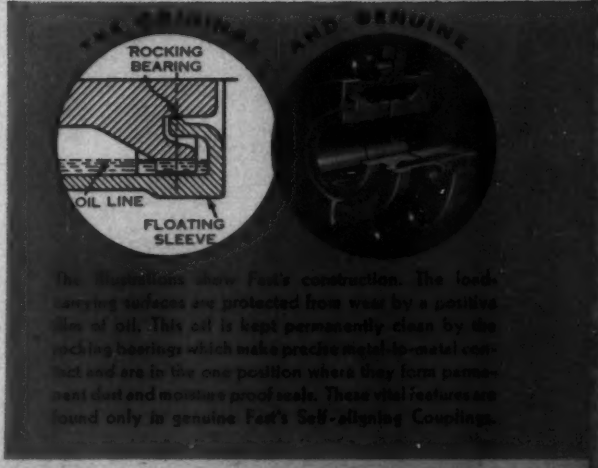
THE SUPERIORITY SHOWS UP IN PERFORMANCE

THE WINNER...

AND STILL THE WORLD'S CHAMPION

In all fields, and against all comers, Fast's Self-aligning Couplings have demonstrated their championship calibre, have won countless decisive battles against wear, maintenance and obsolescence.

The dependability that makes records of 16 years of service possible, comes directly from features that are available *only* in the original and genuine Fast's plus correct engineering design, workmanship and construction. To assure the continuous, trouble-free performance that you want . . . specify "Fast's"—and be sure. Koppers Company, BARTLETT HAYWARD DIVISION, BALTIMORE, MD.



The illustrations show Fast's construction. The load-carrying surfaces are protected from wear by a positive film of oil. This oil is kept permanently clean by the rocking bearings which make precise metal-to-metal contact and are in the one position where they form permanent dust and moisture proof seals. These vital features are found only in genuine Fast's Self-aligning Couplings.

FAST'S COUPLINGS

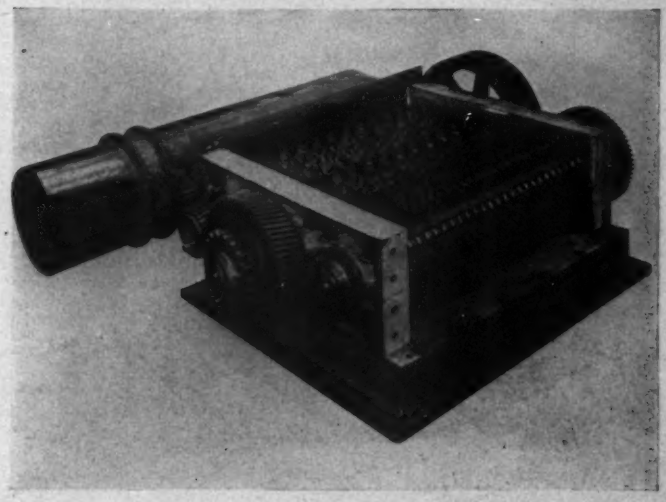
KOPPERS product

WEST COAST HEMLOCK PULP
PULP DIVISION ‡ WEYERHAEUSER TIMBER COMPANY

Shredding Paper Requires Bearings that are

RUGGED

BUILT BY SUMNER IRON WORKS — SKF-EQUIPPED



● *Who knows but that some day this magazine may be a victim of the strong steel fingers of this SKF-equipped Shredder?*

Here's an application on which the three "R's" of SKF Spherical Roller Bearings stand out like the headlines of this magazine. It's the Sumner Paper Shredder that reduces old magazines and paper for reclaiming.

On its low, medium and high speed shafts, SKF Ruggedness, Rolling alignment, and Reliability are constantly in demand.

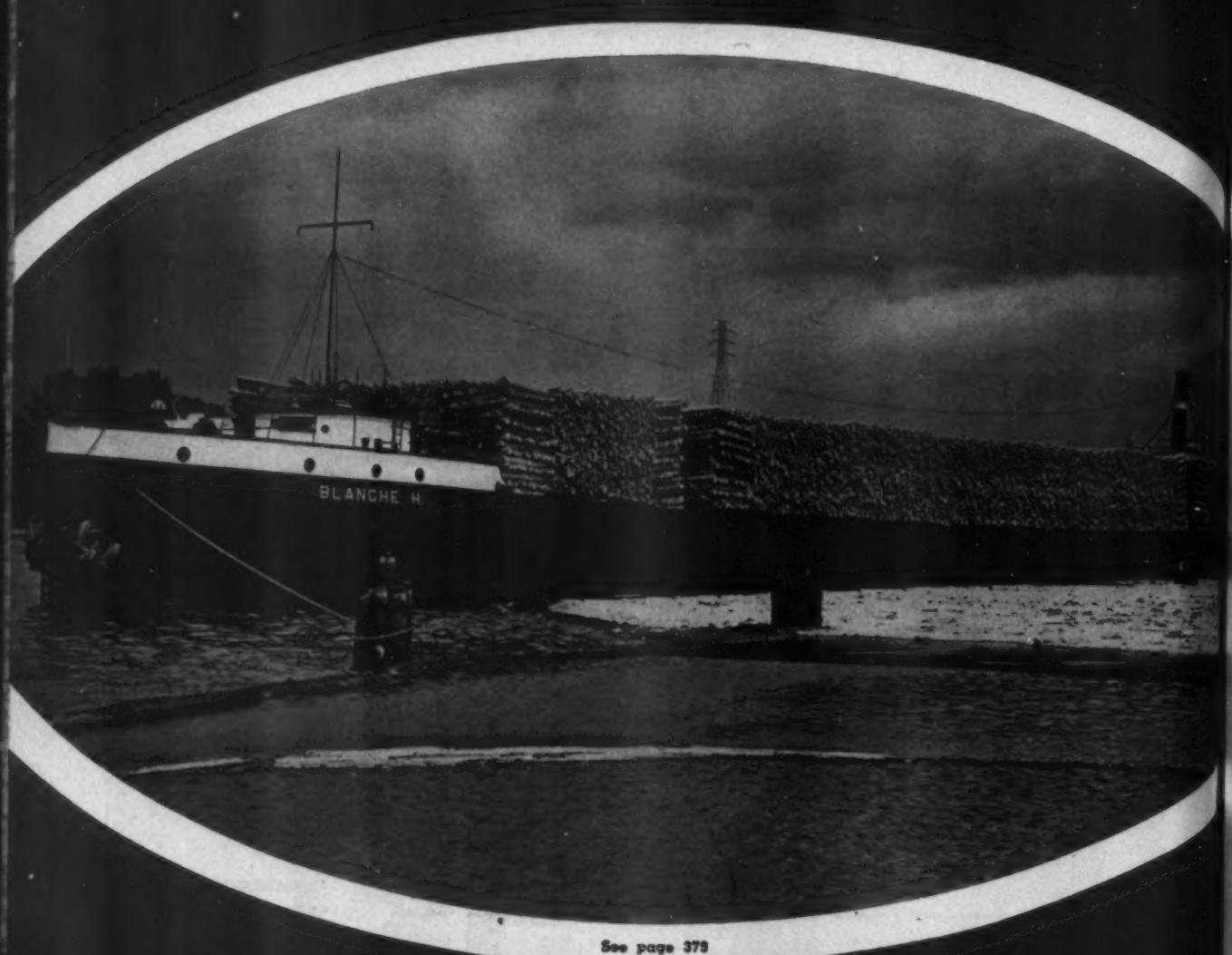
Not only on this Shredder, but on Sumner edgers, screens, borers, barkers, pre-dryers and other equipment, SKF Bearings provide these qualities year after year. The use of SKF Bearings is your guarantee of the right bearing in the right place.

4127

SKF INDUSTRIES, INC., PHILADELPHIA, PENNA.

SKF

BALL AND ROLLER BEARINGS



See page 379

2,800 Cords

TRADE WINDS

National Gypsum's New Mobile Plant

WITH the completion of the new fiber insulation board plant at Mobile, Alabama, the National Gypsum Company adds another major plant to the large number recently built in the South.

The new plant is on a 32-acre site, on Mobile Bay, with complete facilities for shipping by water, rail, or truck. Located on tidewater, shipments can be made by steamer to domestic or foreign ports, and the mill also will benefit from favorable rail rates to the principal inland markets. Private sidings from the Gulf, Mobile & Northern Railroad serve the property.

The plant, which was designed and built by the H. K. Ferguson Company of Cleveland, Ohio, in conjunction with National's engineering and operating departments, is one of the most modern wallboard mills in the country today. With the assistance of the National Gypsum Company's engineering and operating departments, a careful study of all phases of the plant operation was made before the plant was laid out, to insure the best manufacturing practice. All of the equipment installed is of the most improved type available. A modern conveyor system for handling wood out of the yard storage was erected, with a specially designed unloading device for unloading the logs from barges. Provision also has been made for future expansion of the insulation board unit.

The selection of the site is advantageous from the standpoint of raw material supply, low manufacturing costs, and distribution facilities. To insure an adequate supply of raw material, the National Gypsum Company has under option a considerable acreage of timber land in Alabama and Mississippi. The basic raw material used is Southern pine and Southern hard woods.

Straight line production was the main objective in the layout of the plant. From the time the raw material arrives at the property, there is a continuous straight line movement to the finished product, ready for shipment. The logs are received in 4-foot lengths, by rail, barge or truck, and are unloaded directly on to a 1200-foot Link Belt chain conveyor. This conveyor travels at the rate of 100 feet per minute, and carries the logs to the second floor of the mill, discharging them directly to the D. J. Murray slasher saws. Here they are sized into 2-foot lengths.

By gravity, the logs drop into a barking drum for cleaning, and automatically discharge into a soaking pool. From the soaking pool they are measured and racked, and conveyed by overhead crane to the Carthage Machine Company grinders, where they are converted into pulp stock. The pulp is then refined and pumped into storage tanks, from where it goes to the Oliver United Filters forming machine and is made into the mat; it is then fed automatically through the press rolls. The wet sheet is next conveyed through one of the latest type gas-fired dryers made by the Coe Mfg. Company, utilizing approximately 1,000,000 cubic feet of gas daily. This unit is one of the largest built to handle wood fibreboard. The board passes through the dryer in continuous travel, and discharges from the dry end to the Fabricating Department.

The Fabricating Department consists of various intricate and specially designed machines for producing the numerous shapes, sizes, and thicknesses of wallboard, ceiling and wall tile, and insulating board, which are in demand by insulation fibreboard consumers today.

The buildings are of steel frame construction with ample light and ventilation facilities. The floors are concrete and the sidewalls of corrugated

Exterior view showing plant, conveyor system and yard storage.

Left—Forming machine and press roll section. Right—Board dryer.

asbestos and steel sash. All roofs are covered with insulation board to make for cooler working conditions during the summer. Modern washrooms and locker facilities were installed.

In addition to production floor space, there is a boiler house, modern machine shop, control laboratory, and switchboard room. A one-story office building, of brick construction, and fully air conditioned, is located close to the plant.

Power is supplied by the Alabama Power Company, over a newly installed power supply line to the plant. All drying and steam requirements are furnished by natural gas from the local gas company.

A fresh water supply of 1500 gallons per minute is available from wells which were drilled on the property. A connection to the city water supply is also provided for emergency use.

The National Gypsum Company, one of the leading manufacturers of improved building materials in the country, early established a policy that no product was to be manufactured, and no new product added that did not represent either an improvement in the existing material, or a product for new uses. To carry out this policy, a large research organization is maintained, with well equipped laboratories at its several plants. Through this technical staff, new and improved products are constantly being added to the line. With the intensive study which will be carried on by Jere Massey, manager of the Mobile plant, and George Pecaro, assistant manager, it is expected that this plant will develop many new products. Over 130 materials of basic importance to building and other industries are already being manufactured and distributed under the "Gold Bond" label.

The company's main office is located at Buffalo, New York. Melvin H. Baker is president and G. H. Tarbell is vice president in charge of operations. F. A. Manske is production manager.

Following is a list of firms supplying materials and machinery at the Mobile plant:

Adjust-O-Feeders, Proportioneers, Inc., Providence, R. I.

Agitators & Conveyors, Link Belt Company, Buffalo, N. Y.

Air Compressors, Ingersoll-Rand Company, 11 Broadway, New York.

Attrition Mills, Sprout, Waldron & Co., Muncy, Pa.

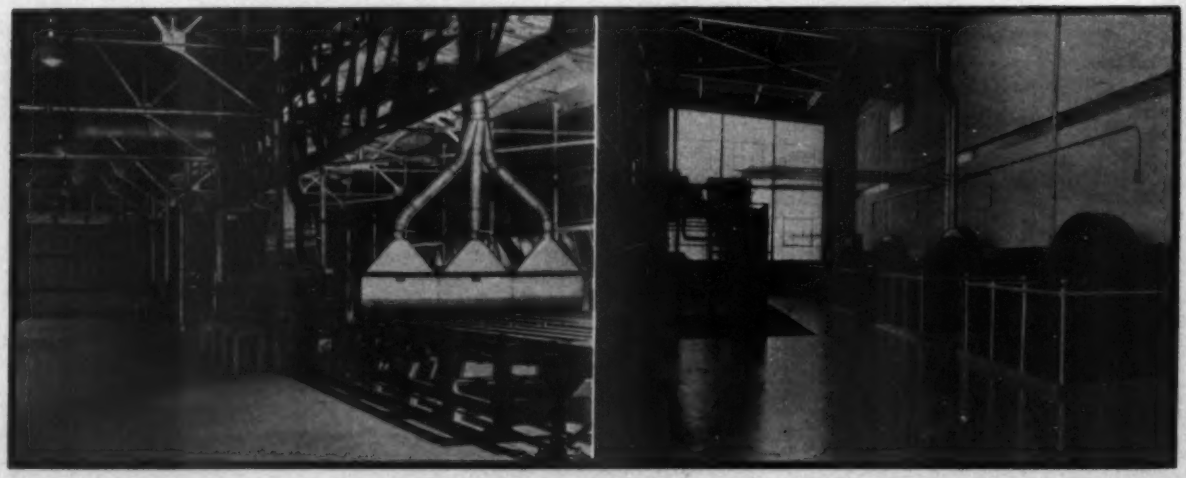
Boiler Equipment, McGowin-Lyons Hardware & Supply Co., Mobile, Alabama; Surface Combustion Corporation, Toledo, Ohio; Strong-Carlisle & Hammond Co., Cleveland, O.

Building Supplies, Underwood Coal Supply Co., Mobile, Alabama; Radcliffe Gravel Co., Inc., Mobile, Alabama; McGowin-Lyons Hardware & Supply Co., Mobile, Alabama.

Corrugated Asbestos Siding, Asbestos Erectors, Inc., Ambler, Pa.

Cranes, Euclid Crane & Hoist Co., Cleveland, O.

Dryer, The Coe Mfg. Co., Painesville, O.



Left—Double trimmer fabricating machinery. Right—Motor room—700 hp. synchronous motors.

Dust Collecting System, The Kirk & Blum Mfg. Co., Cincinnati, Ohio.

Electrical, Hatfield Electric Company, Cleveland, O.

Fabricating Machinery, Yates American Machinery Company, Beloit, Wis.; Mereen Johnson Machinery Co., Minneapolis, Minn.; Chas. E. Francis Company, Rushville, Indiana; J. H. Schroeter & Bros., Inc., Atlanta, Georgia.

Forming Machine, Oliver United Filters, Inc., 33 W. 42nd St., New York.

Glass & Glazing, Builders Glass & Erection Co., Cleveland, O.

Grinders, Carthage Machine Co., Carthage, N. Y.

Miscellaneous Iron, Mobile Steel Company, Mobile, Alabama.

Motors, General Electric Company, Schenectady, N. Y.

Piling, Doullut & Ewin, Inc., New Orleans, La.

Pipe, U. S. Pipe & Foundry Company, Cleveland, O.; Turner Supply Company, Mobile, Alabama; Midwest Piping & Supply Co., St. Louis, Mo.

Press Section, Downingtown Mfg. Co., Downingtown, Pa.

Pumps, Ingersoll-Rand Company, 11 Broadway, New York; Goulds Pumps. Seneca Falls, N. Y.

Reinforcing Steel, Concrete Steel Company, 2 Park Avenue, N. Y.

Roof Deck, Detroit Steel Products Co., Detroit, Michigan.

Saw Equipment, D. J. Murray Mfg. Company, Wausau, Wis.

Screens, Mitts & Merrill, Inc., Saginaw, Michigan; Trimbey Machine Works, Glens Falls, N. Y.; Fibre Making Processes, Inc., Tribune Tower, Chicago, Ill.

Sprinklers, Globe Automatic Sprinkler Company, Philadelphia, Pa.

Steel Sash, Truscon Steel Company, Youngstown, Ohio.

Steel Tanks, Chattanooga Boiler & Tank Co., Chattanooga, Tenn.

Structural Steel, Rogers Structural Steel Company, Corry, Pa.

Valves, The Wm. Powell Company, Cleveland, O.; Turner Supply Company, Mobile, Alabama; Carthage Machine Co., Carthage, N. Y.; Wiener Refiner Engineering Co., Oswego, N. Y.

Ventilators, The Swartwout Company, Cleveland, O.

Washing Drums, D. J. Murray Mfg. Co., Wausau, Wis.

Wells, Layne Central Co., Memphis, Tenn.

Wooden Tanks, W. E. Caldwell Company, Inc., Louisville, Ky.

RECENT ABITIBI DEVELOPMENTS

A three-way deal by which a syndicate of 85 business men of the Sturgeon Falls district would take over the idle Abitibi mill at Sturgeon Falls is expected to be closed very shortly, it is understood. If the plan goes through, with the co-operation of the Abitibi Company and the Provincial Government, its backers aim to start production of groundwood for export early in September. It is further understood that the Lagerloef Trading Company of New York has undertaken to market the entire mill output, according to H. B. Gibbs of Sturgeon Falls, head of the syndicate.

Mr. Gibbs further stated that the Abitibi company was prepared to relinquish its rights to the mill, except for its power plant, and that the Government was ready to turn the mill over to the syndicate as soon as enough funds were on hand and contracts for the output signed.

Meanwhile, G. T. Clarkson, receiver and manager for the Abitibi Company, while admitting that negotiations had been under way for the taking over of "a portion of the property" of Abitibi at Sturgeon Falls, said that it was far too early to anticipate anything.

By a three-to-one decision, the Ontario Court of Appeal has upheld the ban on the Ripley plan for reorganization of the capital structure of the Abitibi Power and Paper Company, Ltd.

A bondholders' committee, headed by J. P. Ripley, had proposed a scheme of reorganization under the Ontario Judicature Act, but Mr. Justice C. P. McTague had refused a motion by the committee asking approval of their plan of sale (cf. *Paper World,* p. 6, March, 1938).

The majority judgment which has now been handed down in appeal by Mr. Justice Fisher held a sale was not constituted by the proposals of the committee. Instead, he suggested, it was a breaking up of one company and the incorporation of another.

Although the various parties concerned in the judgment have not yet announced their course of action, it is generally considered to be very unlikely that the matter will be further appealed. The company's affairs are now back to the stage where they were when reorganization plans were first initiated, with the important difference that the year's grace granted the company by the Ontario Government when the agreement of June 24, 1937 was signed, is now up. This agreement was entered into on condition that reorganization would be accomplished within one year.

Following a conference between G. T. Clarkson, receiver for Abitibi, Premier Mitchell Hepburn and Hon. Peter Heenan, Minister of Lands and Forests, Mr. Heenan stated that while the question of renewal of the agreement between the company and the Ontario Government was not "officially" discussed, the Government's offer would "stand open as a matter of principle."

CRYSTAL TISSUE HAS AIR PROGRAM

The Crystal newscast, heard at 11 P. M. Saturday nights over radio station WLW, Cincinnati, is one of the newest features in the series of advertising and sales promotion activities planned for Crystal Waxed Paper, a product of the Crystal Tissue Company, Middletown, Ohio. This newscast, featuring Paul Sullivan, one of America's favorite news commentators, will be continued throughout the warm weather months when waxed paper sales are at their peak.

◆

CAN. PAPER MILL DAMAGED BY FIRE

Damage estimated at between $200,000 and $250,000 was caused by a fire which recently destroyed the plant of the Valleyfield Coated Paper Mills Company, Ltd., at Valleyfield, Quebec. The blaze broke out shortly after noon on June 23, while all but two of the employees were out of the building. So rapidly did the flames spread throughout the building, that within a half hour after the outbreak was discovered, the whole structure was ablaze.

When the flames threatened seven huge gasoline tanks and a furniture warehouse located near the burning plant, aid was summoned from Beauharnois and from Montreal. Both of the outside fire departments responded promptly, but the local fire fighters succeeded in bringing the blaze under control by the time help arrived.

The company's offices and storeroom, situated in an addition to the building, separated from the main plant by a brick wall, escaped destruction, and the stock of finished paper, some $10,000 worth, was only slightly damaged.

◆

ANTICOSTI TO BE PROTECTED BY GOVERNMENT

Adding his assurance to that of Prime Minister Mackenzie King, that Canada's interests would be protected, Premier Maurice Duplessis declared his Government would never allow Anticosti Island to be alienated to a foreign power (cf. *The Paper Industry and Paper World,* p. 262, June, 1938). The Premier denied that he had held any interviews with representatives of foreign would-be purchasers. Any interviews, he said, that he held with respect to the possible sale of the island, were with the management of Consolidated Paper Company, the owners, and a provincially chartered firm.

"Riegel Ridge," the beautiful new community house and recreational center built by the Riegel Paper Corporation for its employees. The building is located in Hunterdon County, N. J., and overlooks the picturesque Delaware River Valley.

"Riegel Ridge"....

Recreation Headquarters

LOCATED on one of the most picturesque spots in New Jersey—on a high point overlooking the beautiful Delaware River Valley—is the answer of the Riegel Paper Corporation to the social question, "how shall employees best spend their leisure time?" "Riegel Ridge," the newly completed recreation center and community house of the New York paper firm, was dedicated on June 4, by common consensus one of the most beautiful and worth while projects of its kind in the country.

For a number of years the Riegel Paper Corporation has recognized the need for the proper relaxation, both mental and physical, of its employees and had endeavored to provide some form of receration for the employees at each of its mills. But with some 1,250 employees scattered through four mills, in addition to the New York office, the management felt that it was impossible to instill the proper community interest in such enterprises.

Developed on a 143-acre slope and with recreational facilities virtually unparalleled in New Jersey for beauty and scope, the new, vast community center is now practically completed except for some improvements to the ground and is the central recreational headquarters for all of Riegel's employees.

Center of the project is the huge Community Building, fully appointed to carry out the five-fold program of social and athletic activities, crafts, dramatic and educational functions. At the west end of the main floor is the lounge room. 32 feet square, with pine-panelled walls, comfortable furniture in antique patterns, built-in bookcases and a large fireplace. Wide French doors at the south open onto the stone terrace which extends the length of the building. The terrace commands a panoramic vista covering miles and miles of the Delaware Valley in New Jersey and Pennsylvania.

Native stone of interesting bronze hues, picked from old fence rows on the property and dressed there by hand, was used in the masonry which constitutes the main portions of both the guest lodge and main building. White shingles form the balance of the exterior construction making a combination to blend pleasantly with the pattern of the hillside.

The Community House extends east and west and is 175 feet in length. At the left is the gymnasium, measuring 59½ feet by 76 feet, exclusive of the stage at the east end. Under the gymnasium is a game room with four bowling alleys at one side and ample room left on the other side for two pool tables, shuffle boards, ping-pong, indoor quoits and other small space games. The remainder of the lower level accommodates men's and women's locker rooms, boiler room and general storage space.

At the right of the main lobby is the cafeteria dining room, seating 32 persons, and the store counter for sale of refreshments and sporting goods. The adjoining kitchen is electrically equipped throughout.

Secluded from the recreational center and as a private part of the new development is Riegel Lodge, a new mansion which will serve as a guest house for corporation officials. This lodge is beautifully designed in early American architecture and is fitted with appropriate antique furniture. A four-car garage adjoins one end. There are six bedrooms with accommodations for twelve persons. These will be used by officers of the corporation when they visit the mills or by salesmen entertaining buyers. Private baths adjoin each room and the entire house is air conditioned.

John DeMille, acting chairman of the general committee of employees, presided at the dedicatory program on June 4, to which all employees were invited.

Speaking for the general committee Carl H. Bachman presented a life membership card of "Riegel Ridge" to Benjamin D. Riegel, chairman of the board of the Riegel Paper Corporation. Brief addresses were made by George L. Bidwell, vice-president and general superintendent; John L. Riegel, president of the company; Frank E. Smith, athletic director of Riegel Ridge and Mrs. Smith, women's recreation director.

B-C FOURDRINIER
Light-weight, non-corrosive, simplified design, easy to move out in aisle, all controls within easy reach.

BLACK CLAWSON
and
SHARTLE BROS.

TRADE WINDS ARE BLOWING . . . blowing straight in the direction of the new Black-Clawson light-weight, non-corrosive Fourdrinier. Mill men everywhere are talking about this outstanding new machine, because it offers improvements for which they have long been looking. The B-C Fourdrinier is typical of mill equipment built by Black-Clawson and Shartle Brothers . . . highly efficient, presenting opportunities for increased profits.

The Black-Clawson Co. and Shartle Brothers Machine Co.

LIFE OFFICIALS PAY VISIT TO CONSOLIDATED

The new 127-inch wide paper machine installed in the Wisconsin Rapids (Wis.) mill of the Consolidated Water Power and Paper Company was the reason recently for a rather unusual event in the paper manufacturing and magazine publishing business. This new machine, the fifth large paper machine now installed in the Wisconsin Rapids mill, was recently visited by chief officials of *Life* magazine, which publication uses the coated paper produced by the Consolidated mill.

The new machine inspected by *Life* officers was built exclusively to produce coated paper for *Life* magazine (cf. *Paper World*, p. 12, March 1938). *Life* publishers have given Consolidated the greatest coated paper contract ever made in this country and its fulfillment not only requires the full capacity of this machine but additional tonnage from other Consolidated machines. *Life's* contract with Consolidated requires the shipment of about 40 carloads of fine coated paper for each weekly issue and involves several million dollars a year.

The coated paper which *Life* uses is produced through the new invention owned by Consolidated whereby paper is formed, dried, and then coated all in one operation on the paper machine. Consolidated now has six machines equipped with this invention. The rights to use this invention have been sold to large paper companies in England, France, Switzerland and the Scandinavian countries. Already four paper mills abroad have this Consolidated coating invention installed and in operation producing coated papers for many magazines.

Life officials visiting the Consolidated plants included Charles D. Jackson, general manager; Nicholas L. Wallace, and Charles L. Stillman, treasurer of Time, Inc., publishers of *Life*. A banquet in honor of the visitors was tendered to them by officials and executives of the Consolidated company following the plant inspection.

Some of the guests and their host at the Consolidated plant were left to right: Charles D. Jackson, general manager of *Life*; Charles L. Stillman, treasurer of Time, Inc., publishers of *Life*; Charles Barton, secretary of Rice, Barton & Fales, paper machine manufacturers of Worcester, Mass., and George Sumner Barton, president; Nicholas L. Wallace, production manager of *Life*; Earl E. Barry, chief engineer of Beloit Iron Works, and George W. Mead, president of Consolidated.

◆

NEW ABITIBI TUG

The motorship Kam, first of the five tugs ordered by the Abitibi Power and Paper Company for service on Lake Superior, was launched from the yards of Canadian Vickers in Montreal on June 20. Like the others, this tug has been designed for an entirely new type of service, the towing of pulpwood in large booms on Lake Superior, and incorporates the latest developments in modern machine engineering. The ship is entirely arc-welded and is the largest of the type in Canada, having an overall length of 140 feet, a moulded breadth of 29 feet and a depth moulded to the main deck of 14 feet.

◆

JAPANESE POLICY AIDS PULP TRADE

Factors tending to stabilize values in pulp, and which form a long range standpoint provide a more encouraging outlook, are to be seen in: recent announcement of Japanese foreign trade policy, pulpwood exports, and a slow but steady clean up of resale stocks. The Japanese policy is interesting because it promises relaxation of foreign exchange for the purpose of importing "more goods which can be made into exportable merchandise." Inasmuch as rayon products are among Japan's principal exportable commodities, it is not unreasonable to assume that she will permit the entry of larger quantities of the pulp necessary for this. A considerable factor in the slump in New England pulp production can be ascribed to curtailed exports of rayon sulphite, especially Brown Company's 50 to 60 per cent operations.

The exports of wood pulp from Maritime Provinces of Canada is expected to reach around 90,000 to 100,000 cords from St. John, N. B., alone. This holds interest to the pulp and papermaker, because much of this wood was cut for New England mill consumption, and threatened to break the wood market. Some has actually been diverted from its intended destination in the State of Maine. Germany is the principal buyer, supposedly because of inability to get enough wood from Russia.

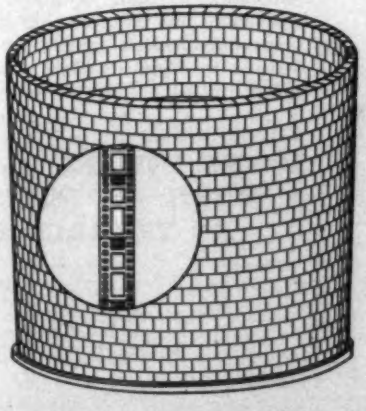
The clean up of resale stocks is obvious. Of late, some resale lots of bleached and unbleached sulphite have been dumped at new lows of $50 and $38 respectively, but it can be stated that the brands involved could never be bought for future shipment at these prices. The same might be said of the long held foreign kraft that was cleaned up at the distress price of $35 dock. No good European brand of kraft has been offered under $40, and many are still quoted much higher for 1939.

In the interest of good trade relations, a New England sulphite producer is reported to have voluntarily cut the contract price of a large rayon mill.

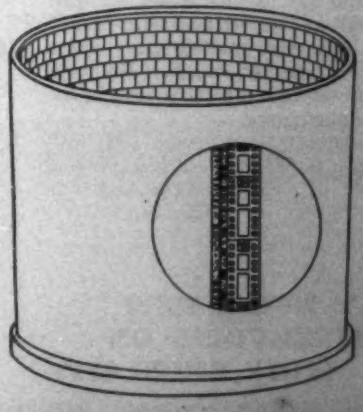
STRONGER, MORE LASTING, MORE SATISFACTORY

Stebbins SEMCO Hollow Tile Tanks — whether single or double wall — of conventional or special design — circular or rectangular — of ordinary or special tile walls — ALL are *better* tanks because they are designed and erected by an organization with over 54 years of successful, specialized service in supplying corrosion-resisting linings and tanks to the leading pulp and paper mills.

Stebbins SEMCO Concrete and Tile Tanks — of 10,000 to 125,000 cubic feet capacity—designed and erected by Stebbins under the Hewett System of Prestressed Design — permit the practice of economies and operating methods never before possible. They are economical in first cost — designed to meet individual operating conditions — and exceptionally long lived.



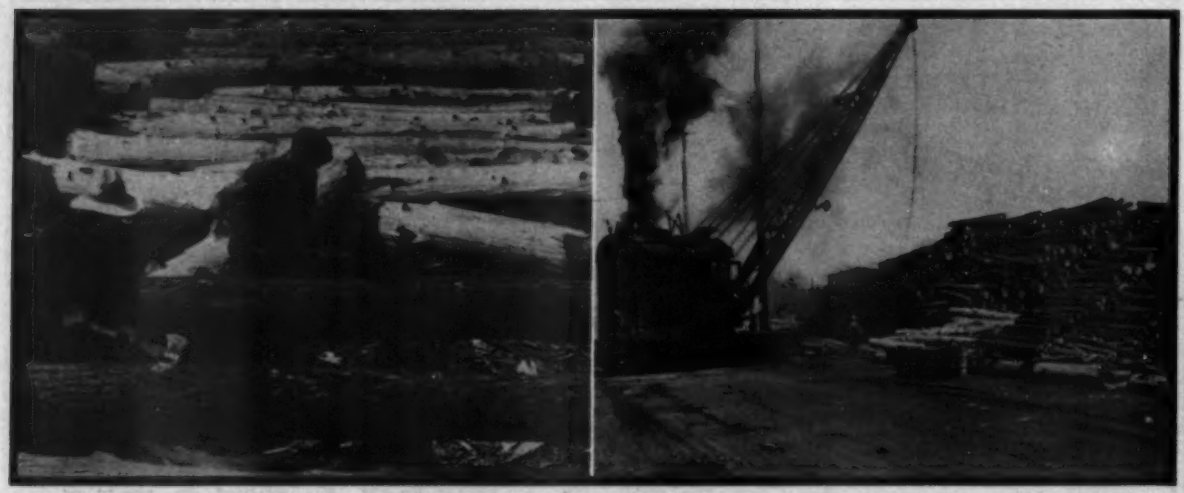
Designs, specifications and estimates for the erection of any tile or concrete and tile tank or reservoir — large or small — submitted on request.



SEMCO

Stebbins Engineering and Manufacturing Company

WATERTOWN, NEW YORK



Forty lumberjacks from the northern part of Wisconsin worked on the special job of barking 16-foot hemlock logs which were too large to go through the regular barking machines at the Thilmany Pulp and Paper Company, Kaukauna, Wisconsin. In the picture at left, Ray and Joe Braun, cousins from Wabeno, Wis., are shown stripping bark from the logs. The picture on the right shows part of the logs awaiting the ministrations of the lumberjacks.

LOG PEELERS FINISH WORK AT THILMANY

Forty log peelers from northern Wisconsin have completed two months of work at Thilmany Pulp and Paper Company, Kaukauna, Wis. They were engaged in skinning pulp logs too big to go through the barkers.

A peavey, spud and axe were the tools used by each of the lumberjacks. The men started their work by rolling the logs into position above the ground. A length-wise gash was then made along the top and circular gashes were cut around the log at axe handle length. The spud, which begins as a length of pipe and ends as a flat chisel, was then inserted and the sections were peeled. Spud axes were used in cases where the bark was too tough. The men usually worked in pairs as seen in the above photograph.

Traveling cranes carried away and piled up peeled logs and brought new logs to the workers. The bark was heaped to be sent to tanneries.

◆

MAY BUILD NEW RESERVOIRS ON WOLF RIVER SITE

Two reservoirs to control flood waters in early spring and to provide storage for the normally dry summer months were advocated by the Fox-Wolf Conservation and Improvement Association at a recent meeting held in Oshkosh, Wisconsin. Fifty persons from the paper manufacturing cities of the Fox River Valley made the recommendation for construction of the reservoirs. The meeting was in the nature of a hearing conducted by representatives of the War Department, with Lieutenant Colonel W. H. Holcome, representing the government.

If the recommendations are carried out, one of the reservoirs would be built at North Lily, Langlade County, and the other at Leeman, in Outagamie County. Both would be on the Wolf River, principal tributary to the Fox River. The sites were chosen after four State engineers had made a survey. Total cost was estimated at $953,000.

At present, Lake Winnebago provides the main storage, but sufficient water cannot be impounded because of flood conditions in the spring.

◆

ONTARIO PAPER CO. AWARDS CONTRACT FOR NEW PROJECT

A contract for construction of a power house, barking drums, townsite and other facilities for the development of Black River timber limits at Heron Bay, east of Port Arthur on the Lake Superior shore, has been awarded to Angus Robertson, Ltd., by the Ontario Paper Company. The company will construct a nine-mile road connecting the town site with the railway station at Heron Bay and six miles of logging flumes will be built to aid movement of timber. Construction of the development is to be started at once.

Arthur A. Schmon, president and general manager of the company, explained that the company has been obtaining the major supply of its wood from properties in Quebec, but it has concluded an arrangement with the Ontario Government whereby it will obtain part of its supply in Ontario, on the Black River limits.

◆

K-C MEN PATENT NEW AIR FILTER

A patent on a new type of air filter has been granted to Charles A. Fourness and Herman Walthuis of the Kimberly-Clark Corporation, Neenah, Wisconsin. It includes a series of foraminous belts separately mounted in a casing through which they are moved. The belts contain filtering material and the amount of filtering is determined by their relative positions, the belts being adjustable. The application was approved as to 10 claims. Commercial rights have been assigned to Kimberly-Clark Corporation.

◆

START INITIAL WORK ON MILL AT TERRACE BAY

Preparations are being made for the establishment of permanent operating headquarters at Long Lac, Ontario, by the Pulpwood Supply Company Ltd., of which J. W. McNutt is resident manager. The Pulpwood Supply Company will construct a mill at Terrace Bay, Ontario, and has three survey parties operating out of Long Lac. Work has already begun on the erection of several houses for staff officials, a warehouse and an office. Some cutting on the pulpwood limits of the company was done last fall, and further activities are expected to get under way within the next few months.

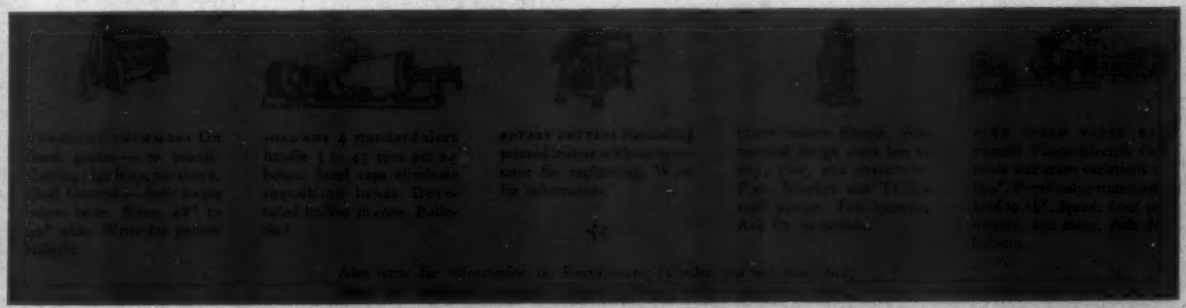
HE LOWERED HIS PRICE

but not his QUALITY

Calender cutting the uneven edges of his board was causing one of our customers such great losses that the cost of his paper had to be high. Some sources paid the price for it, true, but if he could have lowered that price—many new markets could have opened for him.

S. & W. engineers developed for this manufacturer a new calender feed that reduced his cutting losses from 25% to 1 or 2% . . . and the resulting savings enabled him to lower his price.

Write to us for more information on S & W paper machines which include straight Fourdriniers, and the Edwards and Harper type up to 130 inches wide. There is no obligation.



The SMITH & WINCHESTER

Manufacturing 1828 *Company*

ONE HUNDRED AND TEN YEARS OF ADVANCEMENT

PLANT AND OFFICES AT SOUTH WINDHAM, CONN.

Going up! This is what this big smokestack at Northern Paper Mills, Green Bay, Wis., seems to say as it rises slowly in the center of the firm's new $750,000 steam generating plant which is now under construction. The stack being built by the Chicago General Concrete Construction Company, is about half completed, and when finished will tower 234 feet. Having an 18-foot bore at the bottom, the stack rests on a huge mass of concrete 39 feet in diameter and nine feet thick. Construction work also has started on foundations and walls of the power plant, seen to the right. Mill officials expect the first electricity will be generated about Jan. 1.

PAPER FROM FRUIT TREE PRUNINGS

Scientific research work by three Canadian industrial chemists has resulted in a new discovery which, it is believed, will be of considerable importance to the pulp and paper industry of this and other countries. Announcement has just been made that a process has recently been perfected by which fine grade papers could profitably be made from the prunings of fruit trees and forest slush, which until now have been regarded as valueless and troublesome materials.

According to H. R. Peterson, R. J. Hart and T. L. Crossley, of Toronto, who have spent the past two years investigating the question, not only can fine papers be made from these prunings, but the quantity available is sufficient to warrant the erection of pulp and paper mills of considerable tonnage capacity. Lines to be produced will include book, coated, magazine, tissue and cigarette papers.

Following work in the Crossley Laboratory in Toronto, arrangements were made for semi-commercial scale tests in the experimental paper mill at the Forest Products Laboratories of Canada, in Montreal, where five tons of prunings were shipped to be treated under scientific control. Printing tests were run on both coated and uncoated papers produced from the prunings and were highly satisfactory. It is claimed that one of the largest book paper mills in the United States submitted the pulp to tests in its own research laboratory, and found that the printing surface obtained was superior to that of its own high grade soda pulp.

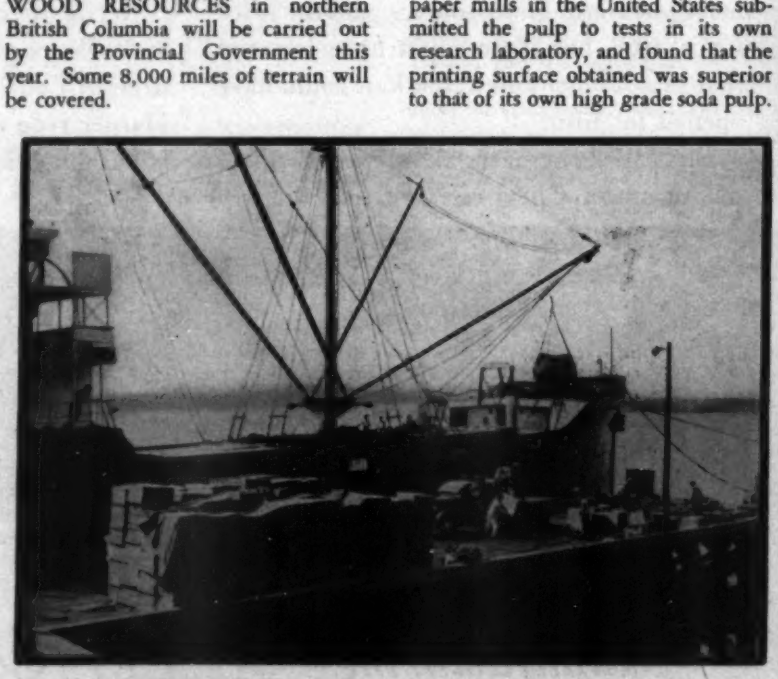
FIRST WATER SHIPMENT OF FLORIDA PULP

The first water shipment of paper pulp made from Florida slash pine was recently loaded at Fernandina on the S. S. Maltran, thus marking the revival in shipping at one of the oldest ports on the Atlantic seaboard,

The accompanying photograph shows the freighter taking on the epoch-making cargo, destined for Philadelphia, from the dock of the new pulp mill of the Container Corporation of America. About 150 years ago this community, the second oldest settlement in the country, was the busiest port on the Atlantic coast south of New York. In that period, records show, more than 100 sailing vessels frequently were in the harbor at one time.

The Fernandina mill, completed by the Container Corporation last December at a cost of approximately $2,500,000 and dedicated in January before a gathering of 6,000 people (cf. *Paper World*, p. 8, Feb., 1938), is strategically situated for utilization of Southern slash pine, which is delivered to the pulp mill by barge, truck or rail.

▶▶▶ AERIAL SURVEYS OF PULPWOOD RESOURCES in northern British Columbia will be carried out by the Provincial Government this year. Some 8,000 miles of terrain will be covered.



S. S. Maltran taking on the first cargo of paper pulp made from Florida slash pine ever to be shipped by water. The ship is loading from the dock of the Container Corporation of America's new mill at Fernandina.

The inventors of the new process maintained that from 1,500 to 4,000 pounds of prunings are produced each year per acre of fruit land, and that undue time and labor are required for the cutting, collection and destruction of these prunings. The wood could be shipped cheaply to the new-process mills, since fruit areas are usually served with adequate transportation facilities. Since the crop areas would be stationary, there would be little change in the supply cost of the raw material, it is believed.

Should the new industry become a fact, it would be able to operate without the usual outlay for timber limits, comprising roads, camps, labor, conservation and hauling. Since the investigation has shown that barking, grinding, or chipping is not necessary when manufacturing the new type of pulp, capital charges for equipment would also be considerably reduced.

The inventors claim that the new process will be of particular benefit to the purchasers of cigarette papers, as they believe that it can produce a better paper at a lower cost than at present, when comparatively expensive linen rags are used as raw material. The process has also been tried out on slash. Should this application be used on a large scale, it would very greatly reduce forest fire hazards and also insect damage to the forests.

Advices from Toronto indicate that financial arrangements are nearing completion for the formation of an international holding company, which plans to license or operate eight or ten mills in various parts of the world. Patents on the new process have been applied for both on this continent and abroad.

◆

WIS. WATERS PROTECTED BY PAPER MILLS

Paper and pulp manufacturers in Wisconsin have invested more than $3,000,000 in waste utilization and treatment facilities that protect normal aquatic life through conserving the dissolved oxygen present in surface waters, according to C. A. Harper, M.D., Wisconsin state health officer. More and more municipalities and industries are treating their sewage and wastes thoroughly.

The state board of health, following recent action taken on the Fox river in the southeastern part of the state, where many large paper mills are located, has now decreed that the Wisconsin river, also used extensively for papermaking, must be cleaned up by 1940.

CEREMONIES MARK OPENING OF BAIE COMEAU PROJECT

THE triumph of industrial progress . . . of man's determination and ingenuity in fighting the barriers of nature . . . was again heralded on June 11 when the town of Baie Comeau, Quebec, a vast development in a former wilderness, the site of the Ontario Paper Company, was officially opened by dignitaries of the state amid colorful dedicatory ceremonies.

Marking the completion of the $30,000,000 development along the north shore of the St. Lawrence River, Canada's newest town of Baie Comeau and the big newsprint mill of the Ontario Paper Company, construction of which began two years ago, were formally opened by Hon. Maurice Duplessis, prime minister of Quebec. Taking part in the opening ceremonies of the town and mill built by the Ontario Paper Company were representatives of the church and state and also of Canada's leading industries including a large contingent from the Niagara Peninsula. Representatives of the *Chicago Tribune* and the *New York Daily News*, with which the interests that have created the Baie Comeau development are affiliated, were present for the opening ceremonies. The majority of the daily output of Baie Comeau's new mill

WIS. PULPWOOD SHIPPING SEASON IS IN FULL SWAY

The biggest load of pulpwood, 2,800 cords of Canadian spruce, was brought to Hoberg Paper Mills, Inc., at Green Bay, Wisconsin, recently by the barge Blanche H. of the Lakehead Transportation Company, Fort William, Ontario, (see page 368). The barge had come from Slate Islands in northern Lake Superior.

Meanwhile, as seen in the photograph below, chugging steam cranes at Kimberly-Clark Corporation's waterfront were busy swinging Canadian spruce from the hold of the big pulpwood barge Maureen H. This spruce is loaded into cars at Green Bay and hauled 22 miles down the Fox River Valley to the Kimberly mills at Kimberly. The wood shipping season, now at its height, will see some 125,000 cords of Canadian pulpwood carried to Green Bay this year for local and valley mills.

The Lakehead Transportation fleet is handling much of the shipping for the pulp and paper mills. E. E. Johnson, president of the shipping firm is also head of the Pigeon Timber Company, which is furnishing most of the wood for the Green Bay mills. An average of three barges, carrying from 2,300 to 2,800 cords of wood enter Green Bay every week during the regular season.

Steam cranes swing Canadian spruce from the hold of the Maureen H. at the Kimberly-Clark dock in Green Bay, Wisconsin.

will go to the latter two papers.

By common consensus the central figure in the elaborate program was Colonel Robert R. McCormick, publisher of the *Chicago Tribune*, who first realized the potentialities of a large scale development in this "forgotten land." Shortly after the World War Colonel McCormick directed actual development at Baie Comeau and at Outardes Falls, eighteen miles west of the town, where a 60,000 h.p. hydroelectric plant is now in operation.

The new development which today offers direct employment to about 1,800 men is of the most modern construction. Manufacturing concerns in the Niagara area benefited greatly from the development, all sharing in supplying equipment to guarantee the comfort, well-being and efficiency of the residents and employees. In addition to the modern newsprint manufacturing facilities, the newly-created town boasts paved streets, several hundred dwellings served by every facility, and a business area including banks, a theatre, schools, churches and a community hall.

◆

MAY REBUILD OLD DAM AT APPLETON

An old power dam at Appleton, Wisconsin, which serves paper mills, will be rebuilt under a plan favored by the War Department, which is contemplating an allotment of $371,500 for the improvement of the Fox River. Another planned project is a turning basin at Green Bay, Wisconsin, which would facilitate docking of large vessels.

CORRECTION

On page 257 of the June, 1938 issue of *The Paper Industry and Paper World*, an item headed "Break Ground in July for Lufkin Newsprint Plant," contained a statement to the effect that each of the four units at the Lufkin (Texas) mill would have an annual capacity of 50,000 tons and that 865,000 tons of newsprint had already been sold to Southern publishers. This information was since learned to be incorrect. The total capacity of the mill will be 50,000 tons annually. Texas publishers are under contract to absorb the entire output of the mill over a five-year period or approximately 250,000 tons and not 865,000 tons as previously stated.

▶▶▶ MASSACHUSETTS PAPER MILLS moved their production ratio upwards in May over April and the number of employees at work rose from 73.8 to 75 per cent of normal.

◆

FINANCIAL

THE closing of Congress, resulting as it did in an almost immediate advance in the stock market, has been reflected in a materially more optimistic sentiment in the paper field, from a Wall Street viewpoint, though paper prices have not shown any tendency as yet to strengthen. While the immediate effect of the ending of suspense over anti-business legislation has been shown in the stock market, other business reports from the industry are not so rosy.

Net income of West Virginia Pulp and Paper Company for the six months ending April 30 were $300,228.

Flintkote Company deferred their usual dividend for the first quarter.

Crown-Zellerbach has declared a 12½ cent dividend as an interim payment, as compared with the 25 cent dividend paid April 1.

Nashua Gummed and Coated Paper Company reports a net loss of $22,862 for the March quarter, compared with a net income for 1937 of $120,055.

The A.P.W. Paper Company for the nine months to March 31 reports a loss of $126,747, as against a loss of $2,788 for the comparable figure for the preceding year.

New York Stock Exchange—Stocks

	1938 Closing Sale June 30	Closing Sale May 31
Celotex	21	15½
Same Preferred	62	—
Certain-teed Products	8⅛	5⅜
Same Preferred	30¾	21
Champion P. & F. Co.	24¾	—
Same Preferred	95	95¾
Container Corp.	18⅜	10
Cont-Diamond	8½	6¾
Dixie Vortex	15	13⅛
Same "A"	31	—
Robert Gair	4	3
Same Preferred	14¼	—
Inter. P. & P.	8¾	6¼
Same Preferred	38½	24⅜
Kimberly-Clark	26⅛	—
MacAndrews & Forbes	28½	—
Masonite	42	27¾
Mead Corp.	13	—
Paraffine Co.	44½	—
Same Preferred	89	—
Rayonier	13¾	9
Same Preferred	20½	—
Scott Paper	44	39¾
Sutherland Paper	25	21½
Union Bag & Paper	12⅞	8½
United Paperboard	6	—
U. S. Gypsum	87½	—

New York Stock Exchange—Bonds

Celotex 4½%	81	—
Certain-teed	71¼	55
Container Corp. 6%	103¼	—
Same 5%	96	—
Inter. P. & P. 6%	81½	80
Same 5%	90½	—

New York Curb Exchange—Stocks

Am. Boxboard	3¾	—
Brown Co. Pfd.	26	19
National Container	7½	6
St. Regis	3¾	2⅜

EIMCO

BRINGS NEW IDEAS AND NEW ECONOMIES TO THE PAPER INDUSTRY

TO EVERY phase of modern industry, where continuous-vacuum filtration can be applied, Eimco Engineers are rapidly bringing new ideas and new economies. The accompanying illustration shows part of a recent Eimco Paper-Pulp installation which initiates the following important *money-saving* advantages:

1. Simplified electric-welded tank and frame construction which reduces both initial and installation costs to new low levels.
2. 50% less maintenance expense than any other known type of continuous vacuum filter in paper-pulp service.
3. Unequalled precision in sheet formation and discharge.
4. No need for steaming, or high-pressure washing, except at periodic shut-downs.
5. Full efficiency at capacities ranging from 1½ to 4 *gallons* per minute per square foot of filtering surface.
6. Fibre losses in white water reduced to an average (over period of one year) of less than ½ *Lb. per thousand gallons.*

All Eimco Filters are *"custom-made"*—designed to meet specified requirements by filtration engineers with many years' experience in their particular fields of industry. The cost is no more—often much less—than that of stock filters, because our superior manufacturing methods and facilities permit important savings in production costs which are largely passed on to purchasers. No matter what your filtration requirement may be—if it can be accomplished by any type of continuous vacuum filter—Eimco Engineers will be glad to submit designs and estimates without charge or obligation. Give us the general picture in your first letter—we'll tell you how much additional information, if any, we need to go ahead.

Eimco 8-ft. x 16-ft. Saveall on news-print white water at plant of Inland Empire Paper Co., Millwood, Washington. Installation also includes two Eimco 8-ft. x 10-ft. Saveall-Deckers operating on book bond and specialties.

A COMPLETE SERVICE

Eimco Paper-Pulp Filters, with suitable modifications in design and construction, are recommended for use as Savealls, Saveall-Deckers, High-Density Thickeners, Brown-Stock Washers, Bleach Washers, and Lime-Mud Filters. All types are available in a wide range of sizes to meet individual requirements. Engineering suggestions and preliminary designs will be furnished promptly on request.

THE EIMCO CORPORATION

634 So. 4th West - Salt Lake City, Utah
U. S. A.

New York: 330 W. 42nd St. - El Paso: Mills Bldg.
San Francisco: 749 Bryant St.

THE EIMCO CORP., Salt Lake City, Utah, U. S. A.

Gentlemen: I am interested in your modern new feature continuous vacuum filters for paper-pulp service and would like to receive further information, with the understanding that no charge or obligation of any kind will be incurred.

Name of individual *Position or title*

Name of company

Mailing address

STATE OF MASS. AWARDS CONTRACTS

The State of Massachusetts recently awarded its third quarter paper contracts to the following bidders:

To the Tileston & Hollingsworth Company, Boston, went the machine finish book, No. 4 sulphite bond and No. 1 sulphite ledger contracts. Arnold Roberts Company, Boston, received the 25 per cent rag-content bond contract while the 100 per cent rag ledger contract went to Von Olker Snell Paper Company. The antique cover contract went to John Carter & Company and the chemical manila contract was awarded to Storrs & Bement Company.

Lots and prices arranged in the contracts were as follows:

Machine finish book, 4.75 cents for 36,000 pound lots ranging up to 5.50 cents for lots under 2,000 pounds; rag-content bond, 10.79 cents for white and 11.54 cents for colors; No. 4 sulphite bond, 5.75 cents for white and 6.25 cents for colors; 100 per cent rag ledger, 26.45 cents and 27.45 cents; No. 1 sulphite ledger 7.50 cents and 8 cents for white and colors; antique cover, 7.50 cents for white and 9.50 cents for black; chemical manila, 4.15 cents.

The State specifies quantities as ordered. Other recent special purchases involved 41,000 20½ x 25, 4-ply white blank from Von Olker Snell Paper Company on Chemical Paper Manufacturing Company's No. 566 at 16.60 and 13,100 sheets of 17 x 22 white onionskin unglazed, at 2.90 and green at 3.20.

◆

INSTITUTE AWARDS DEGREES TO 17

Five doctor and twelve master degrees were awarded to students of the Institute of Paper Chemistry, Appleton, Wisconsin, at the commencement exercises on June 13.

William J. Foot, Jr., the first graduate of Lawrence College to receive a degree from the Institute, wrote his thesis on "An Investigation of the Optical Scattering and Absorption Coefficients of Dyed Handsheets and the Application to These Handsheets." Mr. Foot was awarded his doctor of philosophy degree from the Institute, having received his B.A. and M.A. degrees from the affiliated Lawrence College.

Others receiving doctor of philosophy degrees and their thesis subjects were: Earl Bruce, "Sulphite Pulping of Douglas Fir," (University of Washington); James M. McIntyre, "The Development of a Quantitive Technique for the Evaluation and the Influence of Natural Ageing and Drying Upon This Evaluation," (Pennsylvania State College); John P. Weidner, "The Influence of Humidity on Changes in Diameter and Length of Sulphite Fibers," (University of Illinois); and John C. Wollwage, "An Investigation of the Flocculation of Paper Making Fibers," (Northwestern University).

◆

MARATHON TO RECEIVE WOOD AT ASHLAND

The Marathon Paper Mills Company is concentrating its pulpwood operations at Ashland, Wisconsin, this year. It will receive a total of 45,000 cords by raft towed across Lake Superior from Canada. The wood will be reshipped by rail.

The company has established a piling yard at Ashland and has built two pairs of double tracks, 1,500 feet in length, from the docks to the yard. A hoist will be in operation to unload and to reload it for daily shipments to the mills.

BRIEFS

▶▶▶ ONTARIO PAPER COMPANY, of Thorold, Ontario has completed plans for a new hydroelectric station on the Black River at a site known as Jackfish and will begin work on the project at once. The new station is to cost approximately $850,000.

◆

▶▶▶ FROM NIPIGON, ONTARIO, comes the news that there is much bush activity and boats are loading pulpwood for shipment to the United States. Twenty-seven boats are said to have been chartered for carrying wood during the coming summer.

◆

▶▶▶ WISCONSIN PUBLIC SERVICE COMMISSION, Madison, Wisconsin, has authorized the Wisconsin Public Service Corporation to issue $2,500,000 in 4 per cent bonds to finance new construction and to pay off outstanding loans. About $1,750,000 will be spent on a new hydroelectric plant at Grandfather Falls, near Merrill, Wisconsin.

◆

▶▶▶ AFTER A FLIGHT over northern Manitoba, Premier John Bracken and Col. H. I. Stevenson, forestry chief, report that inquiries have been received as to the feasibility of building a pulp mill, possibly at Cermorant, in the northern part of the Province.

▶▶▶ THE GENERAL WAXED PAPER CORPORATION of 92 Prospect Street, Thomasville, Connecticut, has been incorporated to manufacture, deal in, and convert paper of all kinds. The capital stock is $20,000, all paid in. The president and treasurer of the firm is Arthur W. Moore, Holliston, Mass.

◆

▶▶▶ A CARGO OF SULPHITE PULP, the season's first, arrived the first Saturday in June at the docks of the Marathon Paper Mills Company at Ashland, Wisconsin. It was carried by the steamer, Lawrendoc, and was shipped from Montreal. There were 1,200 tons in the shipment.

◆

▶▶▶ EMPLOYMENT DECLINED BUT LITTLE in the paper and pulp industry in Wisconsin during the first seven months of the current business recession, according to reports compiled from thirty-five of the larger mills by the Wisconsin Industrial Commission at Madison, Wis. The report is complete through March.

▶▶▶ CONTINENTAL DIAMOND FIBRE COMPANY has retained W. H. & L. D. Betz, chemical engineers, as consultants to make a study on proper methods to be employed for waste disposal at the Bridgeport (Pa.) plant of the company. Waste under study includes black liquor from cookers, washer water and white water.

◆

▶▶▶ FOUR PRINCIPAL PAPER MANUFACTURERS in the Fitchburg, Mass., district, all of whom use more or less old book stock in their process, announce that in the future they will discontinue the 3 per cent tolerance for outthrows (groundwood). All purchases henceforth will be net, with outthrows charged back to the shipper.

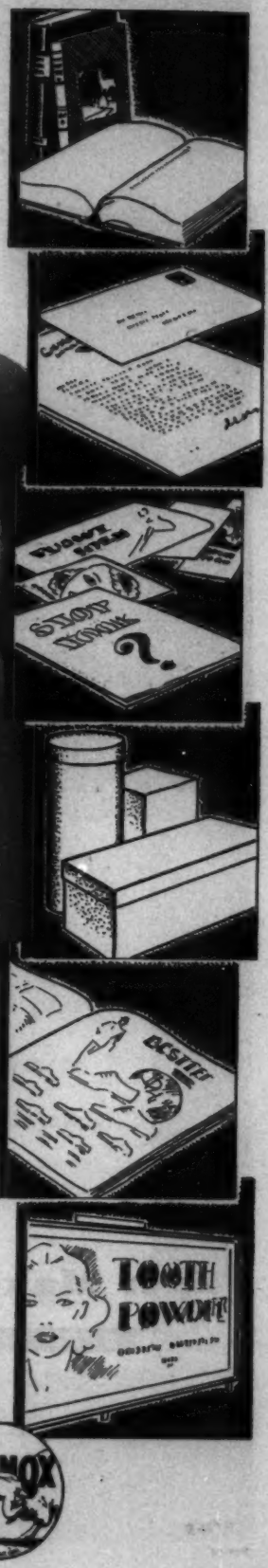
◆

▶▶▶ THE RAFTING OF PULPWOOD across Lake Superior from Canada to Ashland, Wisconsin, has been started by Newaygo Tug Line, Inc. The tug, Butterfield, brought the first raft into port for the Consolidated Water Power and Paper Company. Kimberly-Clark is also bringing pulpwood to its dock at Green Bay, Wisconsin, by barge from Canada.

OPACITY · WHITENESS · BRIGHTNESS

From Baby Bonds to Billboards...

BETTER PAPER with LESS FILLER



TITANOX-A and Titanox-B-30 answer the paper-maker's demand for better, more economical fillers. Whether they are used in bond or book stocks, tissues, utility stock or in any other, they definitely improve the qualities of opacity, whiteness and brightness of the paper with minimum loading.

These modern pigments give to paper a degree of whiteness and brightness never before obtained and mask any discoloration. They are chemically inert, have extremely fine particle size and will not react with any other constituent of paper. Because of their inertness, after-yellowing is minimized. When applied as a beater addition, they are well retained and are adaptable to various surface treatments and coating processes.

Titanox pigments are the modern filler for modern paper. Are you using them?

TITANOX-A is pure titanium dioxide, which is the most opaque and whitest white pigment obtainable. It represents the greatest hiding power available in opaque white pigments. It is particularly recommended for stocks in which opacity, whiteness and brightness must be produced with a minimum of pigment.

TITANOX-B-30 (Titanium Barium Pigment) is titanium dioxide combined with an inert base. It gives exceptional opacity, whiteness and brightness at lower cost, and is especially applicable to all types of paper in which higher pigmentation is permissible.

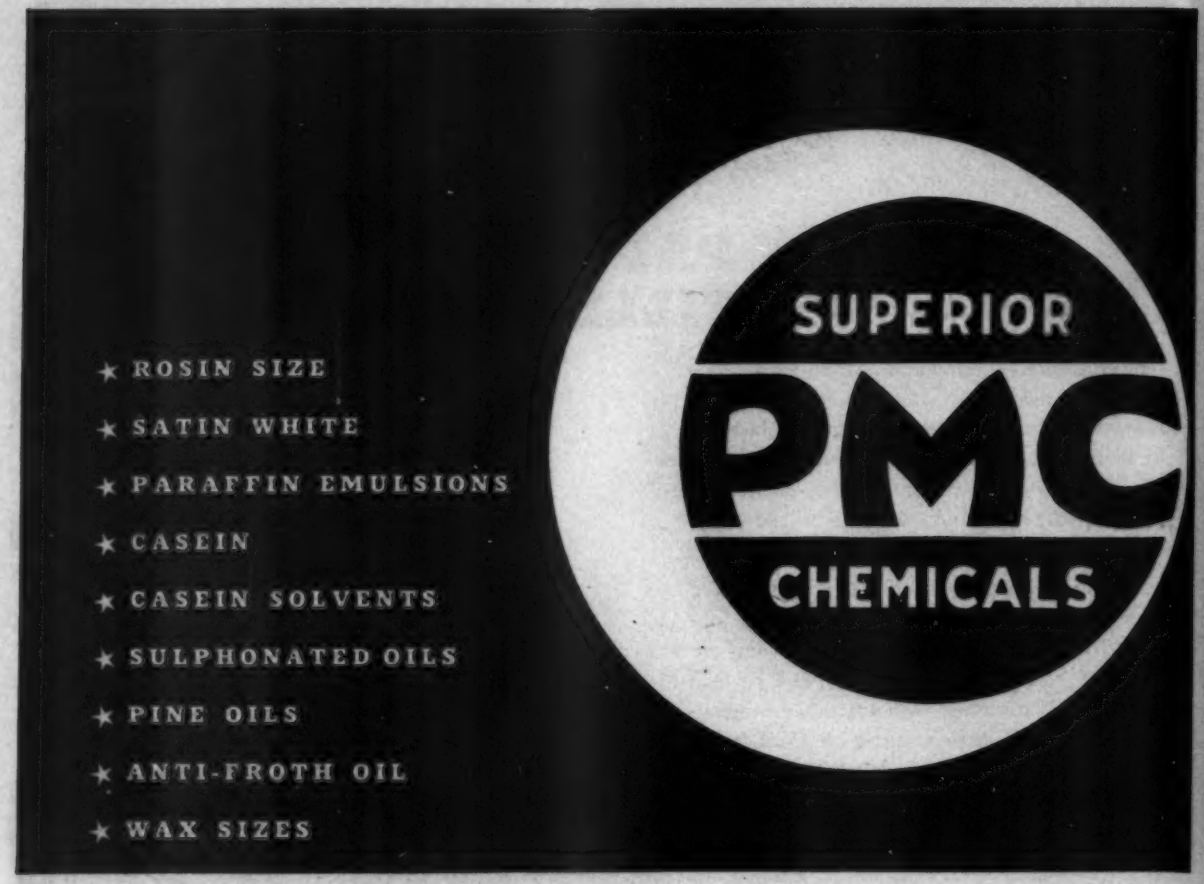
TITANIUM PIGMENT CORPORATION

Sole Sales Agent

111 Broadway, New York, N. Y.; Carondelet Station, St. Louis, Missouri; National Lead Company (Pacific Coast Branch) 2240 24th Street, San Francisco, California

Our Service Department will be glad to consult with you on the technical details involved in the use of Titanox pigments.

TITANOX TRADE MARK



Superior Chemicals for Paper Makers

Paper Makers Chemical Division

HERCULES POWDER COMPANY
Incorporated
Kalamazoo, Michigan

BRANCH OFFICES:

Stoneham, Mass.
Holyoke, Mass.
Providence, R. I.
Albany, N. Y.
Carthage, N. Y.
Lockport, N. Y.
Easton, Pa.
Wilmington, Del.
Atlanta, Ga.
Savannah, Ga.
Jacksonville, Fla.
Pensacola, Fla.
Marrero, La.
Kalamazoo, Mich.
Milwaukee, Wis.
Chicago, Ill.
Portland, Ore.
San Francisco, Calif.
Freeman, Ont.
Erith, England

PM-66

WIRE LIFE • WEAR RESISTANCE • • •

are built-in qualities assured to you by EASTWOOD principles of wire construction. ● RESEARCH *plus* practical development over the years *standardize* EASTWOOD WIRE productions for low-cost operation, extreme service rendition and superior finish.

Look at the WEARSIDE OF YOUR WIRES!

● *Superiority*
● *Economy*
demands
EASTWOOD!

EASTWOOD-NEALLEY CORP.
BELLEVILLE - NEW JERSEY

Economy—

...the Common Bond between Industry and Agriculture

Photograph courtesy The Sisalkraft Co.

By using huge sheets of paper for stack covers held in place by sections of wire fencing weighted with concrete blocks, progressive farmers in all parts of the country are protecting their hay from the destructive action of the elements at costs that are infinitesimal in comparison with the building of permanent barns.

By using Hamilton Felts as standard equipment on their machines, manufacturers of paper whose operations are subject to the most rigid methods of cost control, remove the water from the web at higher speeds, with fewer stops for adjustment and at savings that enable them to sell their product at lower prices and bigger margins of profit.

• *From the coarsest board to the finest tissue, there is a Hamilton Felt that will increase the efficiency of your paper machine.* •

SHULER & BENNINGHOFEN, HAMILTON, OHIO

• Miami Woolen Mills, Established 1858 •

Hamilton Felts are marked by two blue lines full width of the felt and by one shorter blue line midway between them.

Hamilton Felts

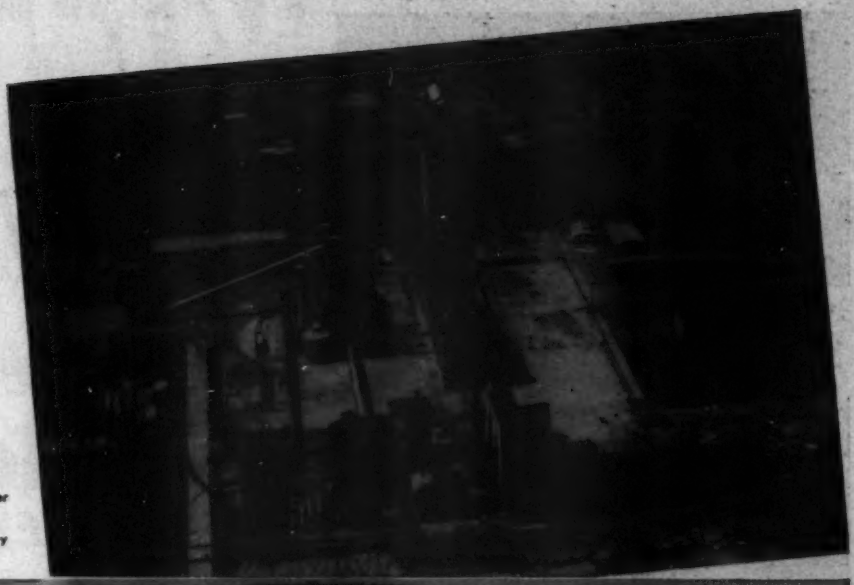
"La Moisson De Colza, La Recolte Du Colza" by Jules Adolphe Breton—Courtesy of The Corcoran Gallery of Art, Washington, D. C.

"The Harvest is in the Seed"

THE PUSEY AND JONES CORPORATION, WILMINGTON, DELAWARE

EVERY ASBESTOS DRYER FELT IS AT LEAST 40% COTTON
And, of course, with the 40% cotton, there's 60% asbestos. So, either way you look at it, a dryer felt manufacturer has to know considerable about both materials in order to make thoroughly uniform and dependable asbestos dryer felts. What's more, if he wants to be open-minded on the subject, he needs to know about the actual production and performance of both asbestos and cotton dryer felts. Because, somehow, it just isn't human nature to stay open-minded about something you don't make but that takes business away from you!
Hooper has been making both kinds of dryer felts for a long time now; and what we know about cotton we started to find out just before the War of 1812. Yet, when we're interviewing you about your dryer felts, we still like to do at least 60% listening and not more than 40% talking. Because, unless we can match what we know about your mill and your machines and your production requirements, one of us is bound to be disappointed. And, whichever one it is, we just can't win!
WM. E. HOOPER & SONS COMPANY
General Offices: Juniper & Cherry Sts., Philadelphia • 320 Broadway, New York City • 360 W. Adams St., Chicago, Ill.
Selling Agents: GENE BECHARD, Atlanta, Ga. • HARRY W. STRATTON, Portsmouth, N. H. • M. E. AVERY CO., Watertown, N.Y.
HOOPERWOOD ASBESTOS DRYER FELTS
HOOPERWOOD COTTON DRYER FELTS
HOOPER KNOWS
both sides of the dryer felt question

Two Recent Installations of the CHEMIPULP PROCESS



UPPER - - New Mill Puget Sound Pulp and Timber Company at Bellingham, Washington.

LOWER - - New Mill Ontario Paper Company Ltd., Comeau Baie, Que.

The Puget Sound Pulp and Timber Company's new mill at Bellingham, Washington, and the Ontario Paper Company's new mill at Baie Comeau have installed the Chemipulp System.

Although geographically far apart, the objective of both companies is the same; that being to to produce a higher grade of sulphite pulp at lower costs. In each instance these are repeat orders from these companies.

The above installations are two of the 53 Systems of the Chemipulp Process in operation or in process of operation. 11 different companies have placed 16 repeat orders for the Chemipulp System.

A total of 53 Systems installed is impressive, but the fact that very nearly one-third of all the business of Chemipulp Process Inc. consists of repeat orders is, we believe, significant.

Every installation of the Chemipulp Process has shown substantial savings in the cost of producing sulphite pulp and at the same time has improved the quality of the product.

CHEMIPULP PROCESS INC.

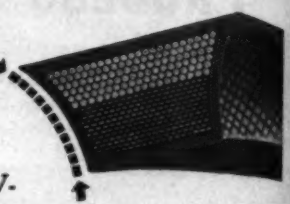
300 WOOLWORTH BUILDING
WATERTOWN, NEW YORK

3311 FIRST AVENUE SOUTH
SEATTLE, WASHINGTON

Associated with CHEMIPULP PROCESS LIMITED, Montreal, Quebec

Feel THE Sidewalls of ANY V-BELT *AS IT BENDS*

Prove for Yourself WHY the Concave Side SAVES MONEY



Feel the side-walls of *any* V-belt as it bends. You will feel its top narrow under tension, its bottom widen under compression. You will see that a *straight-sided* V-belt *must* assume in its sheave-groove the shape shown in figure 1, below. Note the out-bulge of the sides!

Now try the same test with a Gates Vulco Rope. You will find that the *same shape change* merely *straightens* the precisely engineered concave side (see figure 2). There is no side-bulge. This insures uniform side-wall wear; *longer* life! Moreover, the full side-wall grip on the pulley naturally carries heavier loads without slipping—a saving in belts and also a saving in *power!*

The Gates Vulco Rope is the only V-Belt built with the patented concave side.

Engineering Offices and Stocks in All Large Industrial Centers

THE GATES RUBBER COMPANY

Factory Branches

Terminal Building, Hoboken, N. J.
1524 So. Western Ave., Chicago
741 Warehouse St., Los Angeles
2213 Griffin Street, Dallas
999 South Broadway, Denver

GATES VULCO ROPE DRIVES

TO MILL OPERATORS SEEKING NEW FACTS ON MILL MODERNIZATION

NOW IS THE TIME

to TAKE TIME for Thoughtful Renewal of Plant Equipment

IN rush times, a paper mill usually cannot spare the time to make thorough plans for replacements and modernization. But, because the application of modern electric equipment can often be justified on the basis of increased production and lower manufacturing cost per ton, today may be the prudent time—when conditions are less rush—to consider modernization.

Outstanding improvements have been made in many types of electric equipment in the past few years; in a number of cases prices, too, have been reduced through increased manufacturing economies.

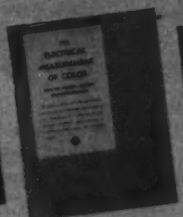
Now, *today,* while the rush tempo has subsided, is an excellent time to act, to plan for progressive modernization. To provide you with information on its latest types of electric equipment, General Electric offers you the following recently published booklets. Just check the ones you want and send in this coupon. General Electric, Schenectady, N. Y.

ASK FOR ANY OF THESE RECENT PUBLICATIONS

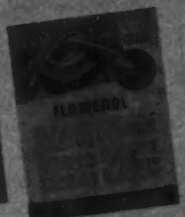
EA-1929A. ...-motors. Pic... typical gear... ...tor installations

GEA-2026A. Low-speed brake-motors. Characteristics and advantages of this type of motor

GEA-1609B. Magnet wire. How to select the right size and type

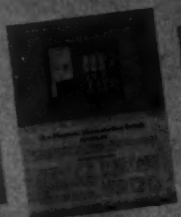


GED-676. G-E spectrophotometer. Describes its application to color analysis



GEA-2733A. Flamenol wire. Describes the properties of this finish

GEL-582. Power-factor-improvement equipment. Pictorial folder

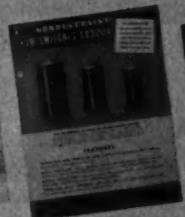


GEA-19H. A-c magnetic motor-starting switch. Two-page description

GEA-1607B. D-c generators (2- or 4-pole). Description of construction. Also tables of ratings

EA-432C. D-c ...erators (4- or 6-...le). Description ...construction. Also ...ble of ratings

GEA-1440G. Arc welders. Advantages of using G-E welders. Describes design features



GEA-250C. A-c drum switches. Construction features and their relation to successful application

GEA-1784A. A-c portable instruments. Descriptions and pictures of these testing instruments

GENERAL ELECTRIC COMPANY
Dept. 6A-323
Schenectady, N. Y.

Please send me the following publications:.....

.....

Name .....

Firm .....

Street .....

City..... State .....

011-420

GENERAL ELECTRIC

THE FINISHING TOUCH

THERE are still some jobs in Mathieson's plants which science just can't reduce to routine. Finishing solid caustic soda, for example, is one which calls for unusual skill on the part of the workman. Thus even at Lake Charles—"the most efficient alkali plant in the world"—it takes men like J. V. Campbell to furnish that "finishing touch" which has so much to do with the quality of Mathieson Solid Caustic.

Jim Campbell, carefully watching over his caustic pots, is one of the hundreds of capable, loyal men who give their best to Mathieson's "big little" jobs. Skillful, proud of their work, these men constitute one of the important reasons for the day-in and day-out dependability of Mathieson Chemicals and Mathieson Service.

The MATHIESON ALKALI WORKS (Inc.)
60 East 42nd Street **New York, N. Y.**

Soda Ash . . . Caustic Soda . . . Bicarbonate of Soda . . . Liquid Chlorine . . . Bleaching Powder . . . HTH and HTH-15 Ammonia, Anhydrous and Aqua . . . PH-Plus (Fused Alkali) . . . Sulphur Chloride . . . CCH (Industrial Hypochlorite) Dry Ice (Carbon Dioxide Ice) . . . Analytical Sodium Chlorite

Editorial ★ ★ ★

TAKE A VACATION

▸▸▸ SOME INDIVIDUALS, executives and workers alike, are of the opinion that business just can't go on if they are not on the job.

The average executive with this point of view probably feels that his daily presence on the job is necessary to keep his organization functioning smoothly. He visions all kinds of things that might go wrong if he were absent. He is unwilling to trust the efficiency of the organization that surrounds him.

The worker of similar viewpoint possibly feels that his work would stop if he were not on the job; or at best, it would be placed in the hands of a less efficient employe. Like the actor, he wants the show to go on and, to do so, he must stay with the job to fulfill his part in it.

In some instances, perhaps, such points of view are justified; but ordinarily in a typical business organization that is at all efficiently organized, it is not so. The boss can go away and the work goes on just the same. The worker can take time off and his work in some way gets done to the satisfaction of every one.

It is good to take a vacation—go some place, do something that is different, get away from the routine of regular work.

If you can, and haven't already done so, arrange for a vacation this season. You will find it stimulating, invigorating, and healthful; and will come back to the job with renewed vigor and enthusiasm.

THE LAW OF SUPPLY AND DEMAND STILL STANDS

▸▸▸ ON SATURDAY, June 8, the New York Stock Market traded in a total of 118,000 shares, the lowest volume in twenty years. Dow Jones industrial averages closed at $113.23 per share. Then everybody connected with the stock market went home for the week-end blue as a whetstone and every holder of stocks let his chin sag down on his chest a bit farther and said, "What's the use? We're sunk!" Neither the Great White Father at Washington nor any of his associates had a cheery note to give to the thoroughly disheartened and liquidated citizens of the country who had been heroically trying to pull business up out of the slough of despond into which the administration's blunders had driven it.

On Monday, June 20, some keen-minded followers and analysts of current business events determined that the liquidation of the stockholders had been overdone; that only approximately one-quarter of issued stocks were available for purchase and that 75 per cent of them were off the market—besides had there not been a reorganization going on in the directorates of investment trusts, insurance companies, and mortgage loan companies, and individual investors concerning interest rates? There had! But where formerly this great bulk of investment funds had been loaned only on prime stocks and good mortgages bearing 5-6- and 7 per cent, now this huge bulk of loanable funds were ready and willingly seeking loaners at 3-3½ and 4 per cent. What did that mean? It expanded the market demand almost 50 per cent.

Then came June 20, 1938. It was "blue" Monday morning. Certain wise men began to buy stocks of good promise on a moderate scale when, lo and behold, the market took fire and closed some $5.00 a share higher and a volume total of 1,090,000 shares. The next day they all rose higher on a volume of 1,430,000 shares; Wednesday's volume was 1,710,000 shares; Friday, the volume exceeded 2,200,000, and Saturday, they went through the roof. Of course, every one was stunned. It was an accident. The public missed the boat. The market would decline. It must sell off.

But it didn't! Instead, it kept right on going up on maintained volume each day and closed the following Saturday, with the brokers on the exchange, which is a world-wide market, yelling to the world that they would buy their stocks at an up-price.

Dow Jones industrial averages were $25.30 higher on Saturday, July 2, than at the close on Saturday, June 18.

The first day's rise in price and the volume may have been an accident. Even the first week's volume and up-turn may have been a freak. But when it went on through the second week and closed at peak prices bid, and then went on into the third week of continued, consistent volume, and to new highs, it is out of the realm of chance and enters the realm of design and reason.

What is the reason?

A combination of the most unprecedented conditions and factors making for a boom, the like of which this country has never seen before. Watch the commodity markets next—

You can monkey just so long; set at naught the law of supply and demand, and then—it turns and bites you.

THE SUPERINTENDENTS ASSOCIATION

▸▸▸ THE NINETEENTH ANNUAL CONVENTION of The American Pulp and Paper Mill Superintendents Association, held on June 22, 23, and 24, 1938, in Toronto, Ontario, represents another milestone of progress in the history of the Association. It was the first annual meeting of the Association to be held outside of the United States. The other previous annual meetings of the Association, following the meetings of 1919 and 1920 (both of which were held in Chicago) in order of occurrence, were held in New York, N. Y., Kalamazoo, Mich., Springfield, Mass., Dayton, Ohio, Niagara Falls, N. Y., Detroit, Mich., Richmond, Va., Pittsfield, Mass., Wausau, Wis., Philadelphia, Pa., Dayton, O., Buffalo, N. Y., Green Bay, Wis., Poland Spring, Me., Richmond, Va., Grand Rapids, Mich., and Springfield, Mass.

Something of good came from each one of these meetings and each of them related progress that was being made by the industry.

Not only have the delegates and others who have been able to attend one or more of these meetings profited by the proceedings, but many others have profited as well. The technological literature of the industry has been considerably enhanced by publication of the various papers which have been presented before these assemblies, and, of course, there are no boundaries for the printed word.

Now the Association through its Toronto meeting takes on an international aspect. May this meeting be only the beginning of even a more broadening scope of Association activity so that in the future the Association, always with the one thought in mind—The Good of the Industry, will continue to expand and grow.

WE MOVE FAST NOW-A-DAYS

WILLIAM SIBLEY

LAST week I had an interesting chat in the lounge car of the "Dixie Flyer" running through Indiana. The man with whom I was talking was a southern Indiana coal producer—the owner of several large strip mines in that territory. Quite naturally we fell to talking about the coal business, I working the trend of the conversation around to the point where we discussed the in-roads now being made into that business by the oil-burner, the gas-burner and the electric heat. In response to one pointed question he made this gratifyingly-visionary reply: "I am right now in much the same position as my father-in-law back in 1920. At that time the old gentleman had more than one hundred and fifty ice-wagon routes in Chicago. With the exception of the Consumers Company, he was the largest manufactured ice dealer in Cook County, and at that time, continuing through several years thereafter, too, I used to have stiff arguments with my father-in-law about electric refrigeration. It was new then, and I claimed that the use of mechanical refrigeration would continue to grow—and grow fast. But the old man couldn't see it. He scoffed at the idea. He asserted that people just wouldn't pay three or four or five hundred dollars for "some gadget to make ice." He maintained that electric refrigeration was too costly, both in the matter of the appliance and in current consumption. But listen: before the fine old gentleman passed on—the mechanical refrigeration people had virtually confiscated his property—had put him so far out of business that when he died he was completely out of the ice business and was more or less successfully running a van and storage firm—two of his large ice plants having been rebuilt into storage warehouses."

"Yes . . . and I'm not kidding myself at all. All of us fellows in the coal business are in a pretty precarious business. Mechanical heat is already draining our best customers away from us (just as the mechanical refrigerator went first into the fine homes) and later on, unless we collectively do something drastic, we are going to lose practically all of our paying patronage. And I'm not the one to prophecy just when such a change will come. We move fast now-a-days. Improvements loom over the horizon, and then by gosh, in just ten years or so, those improvements are basic industries which supplant the older and less improved."

Further evidence of the fact that this chap was right in his basic thinking: that we move fast now-a-days—let me tell you just a few facts about the dog-food industry. Practically all of us have had more or less experience with dogs. Very few of us who are twenty-five or thirty years of age, or more, ever thought of feeding our dogs anything but table scrap. And good food it was, too. But about the time electric refrigeration began its steady march, canned dog food became something to consider as a necessity if one were dog-inclined. And this industry has been of mushroom growth with practically no standards or control. Since, at least for the first entrants, it was a business of quick profits and low manufacturing costs, a great many people entered the field. Today there are over 400 manufacturers of dog food and collectively they do more than $150,000,000 worth of business annually! Considering the fact that there are about 13,000,000 dogs in the country, of which about half live in the metropolitan centers (the which are responsible for 80% of dog food consumption)—this is really a lot of dollar value per dog. In this instance the rise of an industry supplanted no other industry but it *is* evidence of rapid traveling once this country of ours is set in motion.

Right along this line of thinking, there is a worth-while article appearing in the July issue of "Factory Management and Maintenance." The article is entitled "Labor Boomerang in Akron," and is an analysis of the economic difference between the Akron, Ohio, of today and the Akron of 1929. Let me quote verbatim from two blocks of copy in that article.

1929 AKRON

2/3rds of the total U. S. tire and tube business
High wages—average annual rubber worker's income $1,662.00
Population 255,000—90 per cent American born
Fifty per cent of its homes owner occupied
Brisk retail trade, both in necessities and luxuries.

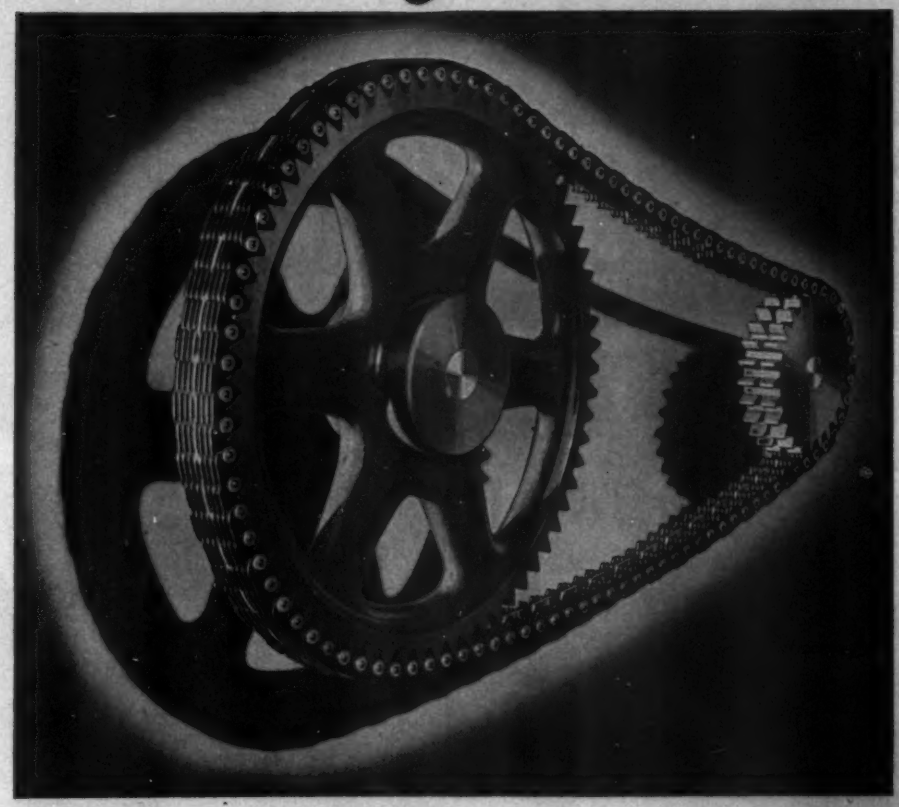
1938 AKRON

1/3 of the nation's tire and tube production
26,000 rubber workers, with 10,000 rubber jobs gone forever
Retail sales off 23 per cent from last year
Building permits down 82 per cent from 1937 figures
70,000 people dependent on some form of relief.

Here is a strange picture of decentralization of industry (to the serious impairment of one large city and four large industrial concerns) brought about by union-imposed labor strife.

Labor unions, when in the wrong hands or under radical guidance, in themselves become an "industry" which is violently and sharply competitive to all other industry. And when this new and vicious "industry" looms above the horizon in competition with your payroll and your payrollee's pay-check—remember what the coal man said about being in a very precarious business and that "we move fast now-a-days."

The Service of TWO Drives



for the Price of ONE

● Facts are facts. You get at least double your money's worth in service from Link-Belt Silverstreak Silent Chain Drives. One will outlast two ordinary drives—maybe even three or four. Many installations have operated 10 — 15 — 20 years and longer. If you buy drives for durability and trouble-free service, send for 96-page Silent Chain Drive Data Book No. 125. It tells the whole story.

Link-Belt Company, Indianapolis, Chicago, Philadelphia, Atlanta, San Francisco, Toronto. Branch offices and distributors located in all principal cities.

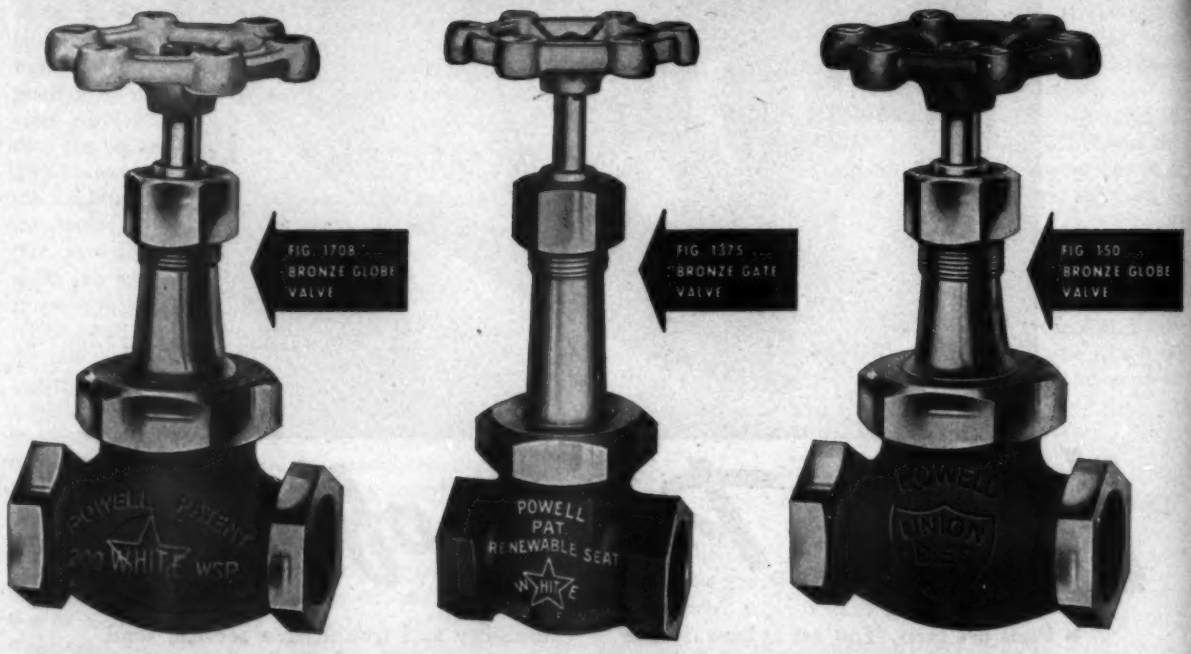
Flexible as a Belt—
More Efficient

—Positive as a Gear
than either

LINK-BELT
Silverstreak
SILENT CHAIN DRIVE

POWELL BRONZE VALVES GIVE MANY YEARS OF *Longer Service*

A TYPE AND SIZE FOR EVERY INDUSTRIAL REQUIREMENT.



Powell Bronze Valves are backed by nearly a century of experience in meeting ever-increasing plant conditions. No matter how small or how large your valve requirements are, the Powell Engineering Staff extends its fullest cooperation to help solve your problems. . . . . .

POWELL VALVES

THE WM. POWELL CO. CINCINNATI, OHIO

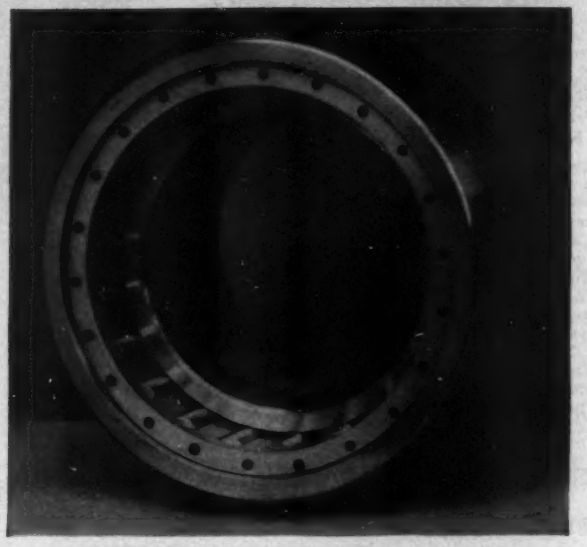
Dryer Cylinders are a TOUGH SPOT for Bearings...

HEAT!

MISALIGNMENT!

EXPANSION!

DEFLECTION!

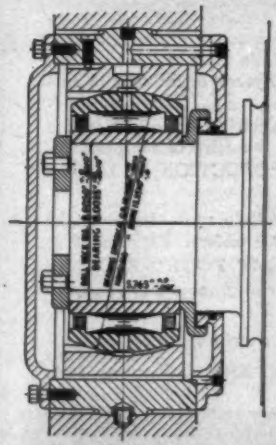


Rollway Bearings STAND UP!

High operating temperatures. Heavy cylinder weight. Deflections in the shaft. Misalignment from warped cylinder heads. Plus a trend to higher machine speeds. ALL of these put a severe strain on dryer cylinder bearings. It's a tough spot that requires a tough bearing.

Rollway dryer-cylinder bearings are engineered to give long and trouble-free operation under this punishment. Their special high-carbon, high-chrome alloy steel is tempered to stand the heat. Straight cylindrical rollers track on a straight cylindrical race, allowing the shaft to float axially for thermal expansion. And the outer race is inclosed by an aligning sleeve—providing well-lubricated sliding contact between a concave and a convex surface that automatically adjusts the rollers to any misalignment in the shaft.

The entire construction works for uninterrupted, trouble-free operation . . . maximum tonnage . . . and minimum maintenance and operating expense.



"Engineered TO THE JOB"

Rollway Bearings carry heavier loads over longer periods because they are engineered to the job. The drawing shows a construction applicable to the tending side of a 228" dryer cylinder. It will carry a radial load of more than 120,000 lbs., at 120 rpm. The aligning feature compensates for a deflection of ¼" in the dryer cylinder. While operating normally at temperatures approximating 306° F. this bearing is designed to cover a wider range up to 1000°.

Types for Every TOUGH SPOT

Rollway's free Advisory Engineering Service will gladly assist you in selecting the highest efficiency Rollway Bearing for:

- ★ Dryer Cylinders
- ★ Jordans—all makes, front, back and outboard bearings
- ★ Felt and Wire Carry Rolls
- ★ Breast Rolls
- ★ Suction Couch Rolls
- ★ Suction Press Rolls
- ★ Cylinder Molds
- ★ Couch Rolls
- ★ Primary Presses
- ★ Main Press Rolls
- ★ Pulp Grinders
- ★ Chippers
- ★ Deckers
- ★ Slitters
- ★ Reels
- ★ Loose Pulleys
- ★ Calendar Stacks—bottom, top and intermediate rolls

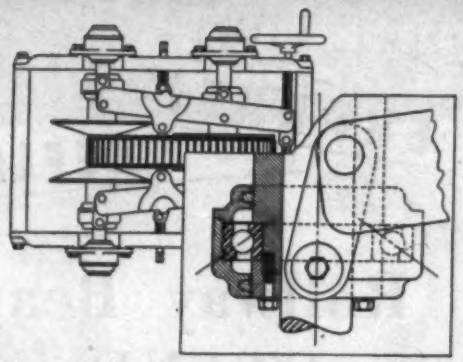
ROLLWAY BEARINGS

31 Years Building Heavy-Duty Bearings

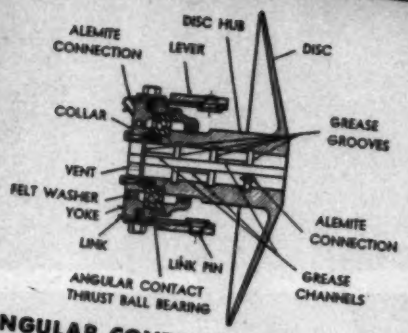
ROLLWAY BEARING COMPANY, INC.

SYRACUSE, N. Y.

Only LEWELLEN HAS THESE IMPORTANT FEATURES



FLEXIBLE BEARING SUSPENSION that is self-aligning in every direction. In the Lewellen Lever and Link Suspension, the center of the link pivots upon a boss which is exactly central with the bearing. Therefore, the thrust load upon the bearing is equally distributed without regard to the position of the discs, as the support is always at the center of the bearing. The discs are moved by a positive, direct pull of the lever through the floating links upon the thrust bearing housing secured firmly to the disc hub. This insures an even distribution of the load upon each ball in the bearing at all speeds, or while changing speeds. When the lever is moved outwardly in changing speeds, the entire disc is moved through the lever and link, without depending upon the wedge action of the belt to force the discs apart. Speeds can be changed under full load with little effort, and with no strains or distortions.



ANGULAR CONTACT THRUST BEARINGS, mounted at the outer end of the disc hub, have a single, diagonal point of contact between the balls and the races. In this way the bearings provide for both the thrust load and the radial load set up by the high speeds of the shaft, and give a much greater load capacity than any other type of bearing. The lubricant seals for this bearing are within its radius, at the smallest diameter of the bearing housing. This, by means of the centrifugal force developed, prevents the lubricant from working out at the seals. The entire thrust bearing is enclosed in an oil-tight housing, which is attached to the main operating levers by suitable link connections, making the bearing self-aligning in every direction.

and you pay no more for

LEWELLEN VARIABLE SPEED TRANSMISSIONS

● We know you'll believe your own comparisons—that's why we're so eager to have you make a thorough inspection of the Lewellen. The precision, the capacity and the long life built into a Lewellen Transmission is the result of more than 40 years' experience in specialized speed-control engineering.

Decide NOW to improve your manufacturing operations with a Lewellen Variable Speed Transmission in the drive of each production machine. The result: INCREASED PRODUCTION AT LOWER COSTS and an IMPROVED PRODUCT.

The Lewellen is an extremely flexible unit that may be adapted to any variable speed control problem. THERE IS A LEWELLEN TRANSMISSION TO MEET YOUR NEED FOR VARIABLE SPEED CONTROL. Our engineers are ready to be helpful.

Call a Lewellen representative or write us, NOW!

LEWELLEN MANUFACTURING COMPANY, Columbus, Ind.

FEATURES THAT MEAN YEARS OF LOW-COST SERVICE

Here's a roll call of Lewellen's exclusive features. In addition to the flexible bearing suspension and the angular contact thrust bearings mentioned above only Lewellen offers a positive, patented lubrication system for disc hubs, keys, and shafts—the famous double block belt and unbreakable belt splice. Test after test have proven that these exclusive features in a Lewellen Transmission mean years of dependable, trouble-free service. Economize the Lewellen way by eliminating expensive repairs and replacements.

★ *Lewellen* ★
VARIABLE SPEED TRANSMISSIONS

The A-E-CO LO-HED HOIST

Accessibility of Working Parts Here

Select THE hoist with the greatest accessibility of working parts. Ask the nearest A-E-CO representative* to show you how quickly the working parts can be reached if repairs are required. Ask him to explain Lo-Hed's exclusive features that mean dependable performance and lower maintenance cost. Let him show you Lo-Hed's uses in scores of industries. Find out why Lo-Hed is the logical hoist for EVERY purpose and why it is the only hoist for low headroom conditions. A-E-CO Lo-Hed HOISTS are built in many standard models, from ¼ to 12 ton capacities.

Reduces Handling Delays Here

*Classified phone directories list the local A-E-CO representative in principal cities. Call him in. . . or write us for the new hoist catalog. This catalog clearly shows you how to select the specific hoist for your requirements.

Other A-E-CO Products
Taylor Stoker Units - Marine Deck Auxiliaries - Hele-Shaw Fluid Power.

A-E-CO Lo-Hed HOIST

AMERICAN ENGINEERING COMPANY

2444 ARAMINGO AVENUE, PHILADELPHIA, PA.

LOOK FOR THIS

Mark of Quality

on

FELTS

It's your assurance of service, design, finish, uniformity, dependability. Complete details upon request.

APPLETON WOOLEN MILLS, APPLETON, WIS.

Dilts

- **BANDLESS BEATER ROLLS:**

  Dilts built and designed for hard wear. Will take any "stuff" you care to work—from raw roofing rags to high grade bonds and ledgers.

- **EFFICIENT AND SAFE:**

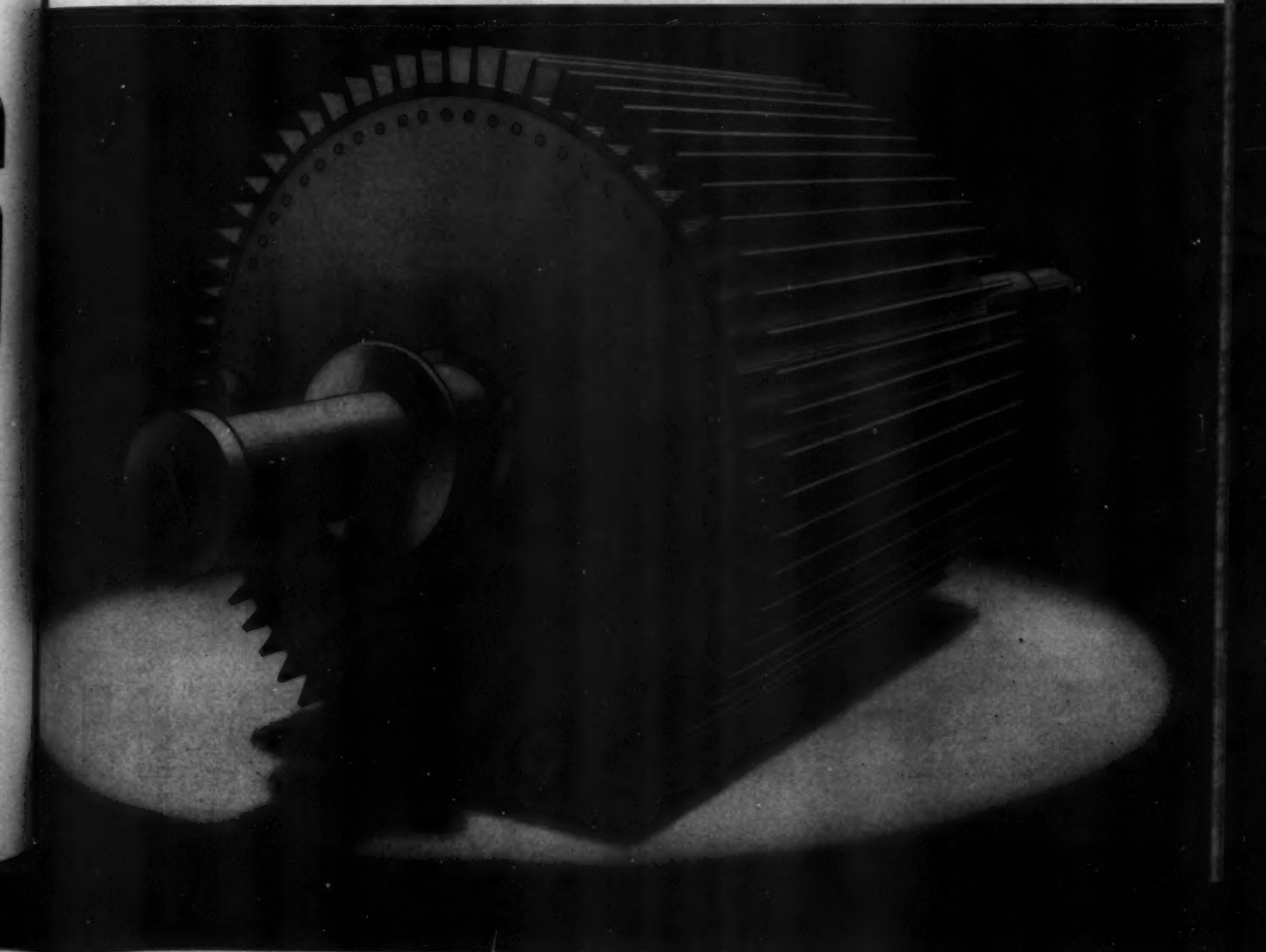
  Continued and safe operation is insured by tapered bars and double tapered locking keys—in addition to the three piece wood filling. Any fly bar can be removed without disturbing others or removing roll from tub. No skilled labor required.

- **YOUR PRESENT BEATERS:**

  May be modernized by rebuilding. Using your old spindle, we can build this Bandless Beater Roll for your safety and plant economy.

Our able engineering staff will gladly consult with you on your individual requirements without obligation to you. Write for details.

DILTS MACHINE WORKS INC., Fulton, N. Y.



Why You Should Install Ryertex Water Lubricated Grinder Bearings . . .

Elimination of Oil Means Cleaner Stock—at Lower Cost

More than 150 stones are now equipped with Ryertex Bearings. Only a small amount of water is needed to cool and lubricate these bearings. The cost of oil lubrication is saved. In addition, actual performance shows a power saving of approximately 50 cents per ton. The elimination of oil also helps produce cleaner stock.

Ryertex Bearings have now been in service in some grinders more than 4 years, yet they show no appreciable wear. They do not score the shaft — they leave it clean and polished.

It will pay you to check up on the many advantages of Ryertex water-lubricated bearings. They are also used in other pulp and paper mill equipment. Let us tell you the complete story.

Write for Bulletin 42P.

Joseph T. Ryerson & Son, Inc. Plants at: Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City.

RYERSON

WATER

PART II—BOILER FEED

A Raw Material for the Paper Industry

R. T. SHEEN[1] and H. M. WILSON[2]

THE paper industry is a large consumer of steam and the scientific correction of the boiler feed water to be converted into steam represents an important chemical problem to the average paper mill.

It is first desirable to consider what constitutes proper conditioning of boiler feed water, and what characteristics of water are desired for this purpose. A properly conditioned boiler feed water, whether conditioned by external, internal or a combination of both methods, should result in the maintenance of clean evaporating surfaces in the boiler. It is well recognized that even a small amount of scale may readily cause overheating of the boiler metal, resulting in failure with costly outages and replacements. Protection must be afforded against both general corrosion and pitting and the water must be so corrected so that a pure dry steam will be delivered from the boiler. Oil present in return condensate should be removed and not allowed to pass into the boiler. Intercrystalline cracking of the boiler metal must be prevented by the maintenance of proper chemical ratios of inhibiting materials to total alkalinity maintained. A low rate of blow down or removal of concentrated boiler salines with replacements by feed water must be held at a minimum for most economical operation. In other words, it must be recognized that no one single factor will dictate the methods of correction that should be employed, but rather the problem must be studied as a whole, taking all of these factors into consideration with due regards for the economics of the proposed solution to the problem.

An ideal boiler feed water will be low in total solids, and particularly low in incrusting solids or hardness. It will be neither acid, nor will it contain a large excess of alkalinity. It will be mechanically deaerated to remove as far as possible all dissolved oxygen and carbon dioxide. The silica content should be held as low as possible. The boiler water under concentration should be somewhat alkaline in character with a minimum pH of 10.5 to as high as 11.3 in most cases. The upper limit for the pH value cannot be as rigidly established as the lower limit and must depend to a large degree on the method of treatment, inasmuch as the pH value of boiler water is rather a guide to the concentration of alkalinity rather than a measure of the quantity of alkalinity. It is most essential that the quantity be determined separately and the final control established on such a determination. Hardness of the boiler water should be held relatively low, and in the case of higher pressure boilers should be totally precipitated. The amount of hardness that may be permitted in a low pressure boiler will depend entirely on the method of treatment employed.

The various methods of treatment that may be employed will be considered under two general headings, External Conditioning and Internal Conditioning, and finally a correlation of these methods for proper evaluation of the problem as a whole.

EXTERNAL CONDITIONING

Lime and Soda Softening

The method of softening water by the addition of lime was first discovered by Dr. Clark of Aberdeen, Scotland, in 1841. Dr. Clark patented the process and it was used to some extent from then on, primarily for softening public water supplies. About fifteen years later, Dr. Porter of London, as a result of certain studies, improved Dr. Clark's method by removing the non-carbonate hardness by the use of soda ash. Water softening on these principles has sometimes been called the Clark-Porter Process, but is now known as the lime and soda process. Lime reacts with the bicarbonates of calcium and magnesium, precipitating calcium bicarbonate as the insoluble calcium carbonate and magnesium hydroxide, in accordance with the following reactions:

1) Lime first reacts with some of the water to form calcium hydroxide:

$$CaO + HOH \rightarrow Ca(OH)_2$$

2) Calcium hydroxide then reacts with calcium bicarbonate:

$$Ca(HCO_3)_2 + Ca(OH)_2 \rightarrow 2CaCO_3 + 2H_2O$$

3) A similar reaction takes place with magnesium salts:

$$Mg(HCO_3)_2 + Ca(OH)_2 \rightarrow MgCO_3 + CaCO_3 + 2H_2O$$

4) Magnesium carbonate formed in reaction 3. remains soluble and requires further additions of lime:

$$MgCO_3 + Ca(OH)_2 \rightarrow Mg(OH)_2 + CaCO_3$$

5) Soda ash then reacts with the non-carbonate hardness precipitating calcium as insoluble calcium carbonate in accordance with the following reaction:

$$CaSO_4 + Na_2CO_3 \rightarrow CaCO_3 + Na_2SO_4$$

Lime and soda softeners may be divided into cold process units and hot process units. Cold process treatment may vary from the relatively simple batch process of adding a given amount of lime and soda ash to water in a tank, agitating and allowing to settle, to the continuous process wherein the lime and soda ash are added to the water continuously as it enters the treating tank, a means employed for removal of the sludge and the treated water taken from the tank, usually passing through filters and then to process or to the feed water heater. Normally a cold process softener will require a retention period of four to six hours for satisfactory precipitation of the calcium and magnesium salts. There has recently been developed a modified cold process lime and soda softener known as an accelator softener in which the precipitates formed by the action of the treating chemicals are allowed to accumulate and kept in constant agitation at the bottom of the treating tank. The precipitates are not permitted to settle but are, rather, kept in the form of a slurry by constant agitation and the incoming treated water is passed upwards through the sludge blanket, with the result that the softening reactions are accelerated and a satisfactorily softened water is constantly drawn from the top portion of the tank. A continuous bleed is provided for the sludge and the length of time required for the cold process softening reduced to about one hour by this system. (Figure I)

The most important type of lime and soda softener for treatment of boiler feed water, is the hot process unit. A

(1) Technical Director of W. H. and L. D. Betz, Chemical Engineers, Philadelphia, Pa.
(2) H. M. Wilson Company, Consulting Engineers, Philadelphia, Pa.

retention time of approximately one hour is required. The incoming raw water is heated in a heater, which in a more modern unit is an integral part of the softener and which may be fully deaerating. The lime and soda are fed to the tank, mixing with the heated water. The treated water is constantly removed through an uptake cone and passed to a non-silicious filter and from that point directly to the boiler feed pump. The proportioning of the chemicals and the entire operation of the softener is automatic, with the exception of the manual control for backwashing the filters. A non-silicious filter medium is specified for removal of the residual precipitates for the reason that a hot alkaline water would tend to dissolve sand and carry silica on into the boilers, and in addition, a rapid cementing of a sand bed will usually result. The most satisfactory materials that have been found for this purpose have been anthracite coal, marketed as "Anthrafilt" and to a lesser extent magnetite. Calcite has been used in a number of installations but in the author's opinion will not prove as satisfactory as anthracite coal. (Figure II)

By use of the fundamental reactions of a lime and soda softener, alkalinity is reduced to low concentrations and on most waters, an actual reduction of the total dissolved solids is effected in this type of unit. An average hardness of 25 to 35 p.p.m. can readily be obtained with very small excess alkalinity although with larger alkalinity concentrations, residual hardness can be reduced to as low as 5 to 10 p.p.m. This practice, however, is undesirable due to the excess alkalinity introduced and in most cases will prove uneconomical, the more satisfactory practice being to precipitate residual hardness by internal methods.

External Phosphate Conditioning

Where the initial raw supply is fairly high in hardness, and particularly high in carbonate hardness, the external hot process lime and soda softener will usually be found to be the most economical method of external softening to be applied. On certain waters with hardness of less than 50 p.p.m. and in the case of treatment of water for high pressure boilers, external treatment with sodium phosphate in combination with caustic soda can sometimes be economically employed, particularly where the water is being treated for higher pressure boilers. Such treatment utilizes equipment very similar to a hot process lime and soda softener and the most important control on such a unit is the maintenance of the proper pH value and a slight excess of phosphate on the effluent from the softener, sufficient to maintain an excess of 40 to 100 p.p.m. in the boiler. Hardness can be reduced externally by such a system to 2 to 3 p.p.m. and in some cases zero hardness can be obtained. On certain waters higher in hardness, where lime and soda softening is used as a primary step, secondary phosphate softening may be employed provided too much additional external equipment is not required. The first stage in such a treatment process is, therefore, treatment either hot or cold with lime and soda ash and the second treatment of the effluent water from this unit with phosphate in a separate compartment of the tank or in a separate tank before introduction in the boiler. A study of the economics of the installation must be made in each case to determine whether such methods can be used more economically than subsequent treatment by internal methods alone following external lime and soda conditioning. (Figure III)

Zeolite

The chemistry of the zeolite process is fairly well understood, but there is one essential difference between this method of softening and softening by such a method as the lime and soda system that should be strongly emphasized. Sodium zeolite softeners contain a base exchange mineral, that is, a mineral that possesses the property of removing calcium and magnesium salts from solution and replacing with sodium salts in accordance with the following reaction:

$$Ca(HCO_3)_2 + Na_2Z \rightarrow CaZ + 2NaHCO_3$$

A similar reaction takes place with magnesium salts and with the other salts of calcium and magnesium, or in other words, for every 40 parts by weight of calcium and for every 24 parts by weight of magnesium, 46 parts by weight of sodium are placed in solution. In other words, and in every case, there is an actual increase in the total dissolved solids of the water from the zeolite softener and the form of the solids only have been changed. All natural alkalinity remains in the water converted to the form of sodium bicarbonate instead of the bicarbonates of calcium or magnesium. Greensand zeolite or natural zeolite will remove approximately 0.4 pound of hardness as $CaCO_3$ per cu. ft. of greensand material while synthetic zeolites or porous zeolites will remove on an average of 1.3 pounds of hardness per cu. ft. of zeolite material. The term "pounds of hardness as $CaCO_3$" is used instead of the term "grains of hardness" to correspond with the growing acceptance in the expression of results on a

Table I

PARTS PER MILLION	Raw	Zeolite Softener	Acid Treatment		Boiler Water
			Before Aeration	After Aeration	
Turbidity as SiO_2	None	None	None	None	Present
Suspended matter	None	None	None	None	Present
Carbonate Hardness (as $CaCO_3$)	30				
Non-Carbonate Hardness (as $CaCO_3$)	10				
Total Hardness (as $CaCO_3$)	40	0	0	0	0
Sulphates (SO_4)	6	6	25	25	900
Chlorides (Cl)	4	4	4	4	136
Iron (Fe)	None	None	None	None	None
Free Carbon Dioxide (CO_2)					
Bicarbonates (as $CaCO_3$)	30	30	10	10	0
Carbonates (as $CaCO_3$)	0	0	0	0	80
Hydrates (as $CaCO_3$)	0	0	0	0	200
pH Value	7.3	7.3	5.7	7.2	11.3
Sulphate Chloride Ratio (SO_4/Cl)	1.5	1.5	6.2	6.2	6.2
Sulphate Carbonate Ratio (Na_2SO_4/Na_2CO_3)					4.5
Per Cent Blow Down					2.9
Oil					
Phosphate as PO_4 p.p.m.	0	0			40

water analysis in terms of parts per million rather than grains per gallon.

When the capacity of a zeolite bed has been exhausted, the bed is regenerated with a saturated solution of salt in accordance with the following reactions:

$$CaZ + 2NaCl \rightarrow CaCl_2 + Na_2Z$$

The calcium chloride from the bed is washed to waste. The water to be zeolite softened should be relatively free of turbidity, practically free from iron or manganese, and should have a pH value between about 6.5 to 8.5. Any appreciable turbidity will tend to coat the grains of the zeolite, reducing the efficiency, and a zeolite should definitely never be employed as a filter. In most cases for most satisfactory operation, where any turbidity is present on the raw supply, primary filtration should first be utilized. Particularly is this the case with the synthetic or porous zeolite.

For most satisfactory operation, rates of flow through a zeolite should not exceed approximately 5 gallons per sq. ft. of area per minute. This limitation will dictate the use of greensand zeolites for waters lower in hardness and synthetic zeolites for waters higher in hardness.

In general, it may be stated that zeolites are suited to treatment of water for boiler feed purposes when the hardness is principally in the non-carbonate form and where the hardness will lie in the range of 50 to 120 p.p.m. Zeolites have a wider field of application where water is used for purposes other than boiler feed as the limitation on a zeolite for boiler feed purposes eliminates this type of softening from consideration on the majority of natural waters.

Hydrogen Zeolites

There have recently been developed base exchange materials composed principally of synthetic resins and sulphonated lignin products that possess the property of base exchange. Not only can such material be used in the sodium cycle, that is exchanging sodium for calcium, but they also can be used in the hydrogen cycle in which cycle the hydrogen ion is exchanged for all other cations. In other words, water passed through one of these organic base exchange materials operating on the hydrogen cycle,will have hydrogen placed in solution, removing the ions of calcium, magnesium, manganese, sodium and potassium, etc. The effluent from such a unit contains the acids of the anions present; in other words, from a natural type of water sulphuric, hydrochloric and carbonic acids would be expected. The carbonic acid can be principally released by aeration while the other acids can be neutralized following the aeration process by alkali or can be mixed with a portion of either raw water or raw water softened in the sodium cycle and in sufficient ratio to neutralize most of the excess acidity. On exhaustion, the bed is regenerated with sulphuric acid and must be carefully washed to remove residual acid before being placed back in service. The organic zeolites possess the advantage over the greensand or synthetic sodium zeolite of being non-silicious and will not impart silica to a boiler feed water. On the other hand, they should not be assumed to be a panacea as on the whole, hardnesses cannot be obtained as low as on the regular type of zeolite nor has operation proven as uniform in tests to date. Unquestionably such units will have their application but must justify their installation both from the standpoint of first cost as well as operating cost and results to be obtained in comparison with other recognized methods of treatment.

Acid Treatment with Zeolite

After softening with the sodium type of zeolite, it is possible to neutralize the excess sodium bicarbonate by the addition of sulphuric acid and such treatment is frequently employed, feeding the sulphuric acid in proportion to the flow of water. One procedure is to allow the water to be aerated over a slate tray or a better method has been found by which the water is allowed to flow through a tank with

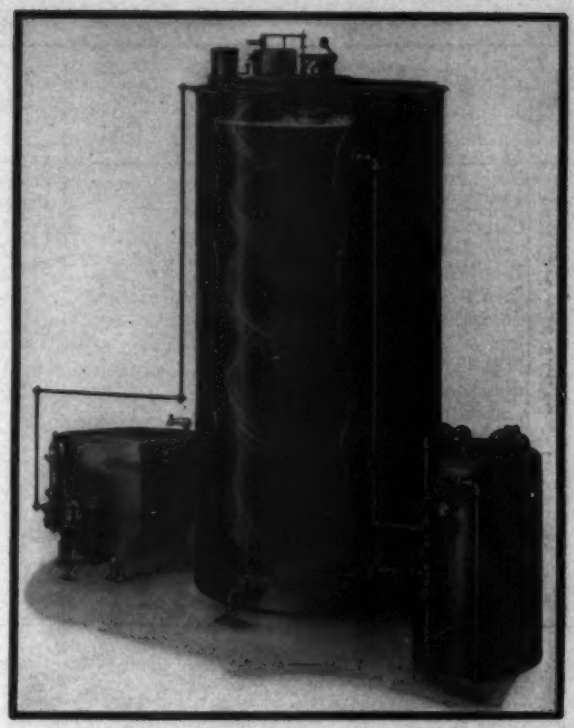


Figure 1—Ground operated water softener.

about 15 minutes retention, blowing air through the water, and diffusing the air in the water by means of porous stone, known as "Aloxite" tubes. These porous stone tubes act to diffuse the air into very fine bubbles and will give a maximum CO_2 removal for a minimum of energy expended in the aeration process. From 0.05 to 0.15 cu. ft. of air per gallon of water is usually required depending on the carbon dioxide to be removed. The addition of sulphuric acid will serve two purposes, the first to neutralize the excess alkalinity and the second to raise the natural sulphate content of the water in such cases where this is desirable to establish a sulphate to alkalinity ratio for inhibition of intercrystalline cracking, also known as caustic metal embrittlement.

Deaeration

The need for complete mechanical deaeration of boiler feed water cannot be over emphasized and is mentioned here inasmuch as it directly effects the chemical treatment of the water. Many plants are operating with open feed water heaters but have no provision for holding a uniformly high boiler feed water temperature. Where possible, the temperature at the open heater should be maintained just as close to the boiling point at the pressure under which the heater is operated as possible and where insufficient exhaust steam is available for this purpose, a thermostatically controlled live steam line should be used to supplement other available sources. Such heat is not lost outside of small radiation losses and will materially aid in delivering a boiler feed water relatively free of dissolved oxygen. Feed water heaters are generally of two types, the tray type and the jet type. In the tray type, the incoming steam is thoroughly mixed with the water falling down over a section of perforated trays and non-condensate gases carried off through a vent. In a deaerating type of heater, provision is made to always carry the temperature of the water in the heater at the boiling point under the pressure at which the unit is operated and a sufficient amount of steam from the unit mixed with the released oxygen and non-condensable gases will pass into the vent condenser as to allow the escape of these gases and the

Table II

PARTS PER MILLION	Raw	Primary Effluent	Secondary Effluent	Boiler	Saturated Steam
Turbidity as SiO_2	S. Trace	None	None	V. S. Trace	None
Suspended matter	Present	None	None	Trace	None
Carbonate Hardness (as $CaCO_3$)	252	18			
Non-Carbonate Hardness (as $CaCO_3$)	72	0			
Total Hardness (as $CaCO_3$)	324	18	0	0	0
Sulphates (SO_4)	80	68	76	928	0
Chlorides (Cl)	3	2	2	32	0
Iron (Fe)	Trace	None	None	None	None
Free Carbon Dioxide (CO_2)	11				
Bicarbonates (as $CaCO_3$)	252	0	6	0	4
Carbonates (as $CaCO_3$)	0	72	36	224	0
Hydrates (as $CaCO_3$)	0	0	0	232	0
pH Value	7.7	10.1	9.3	11.7	5.9
Sulphate Chloride Ratio (SO_4/Cl)				29	
Sulphate Carbonate Ratio (Na_2SO_4/Na_2CO_3)				2.8	
Per Cent Blow Down				6.2	
Oil					
Phosphate as PO_4 p.p.m.			12	70	
Total Solids, p.p.m.	521	179	180	1898	

steam will be condensed and returned to the deaerating heater. Water entirely free of dissolved oxygen can now be obtained in such a modern unit. Such heaters are frequently incorporated or made a part of a hot process lime and soda softener in either the tray or the jet type although the tray type of heater is generally to be avoided where there is a fairly high content of carbonate hardness, that is hardness that will break down on the application of heat and deposit calcium carbonate on the trays of the unit requiring frequent cleaning and reduction in operating efficiency.

Residual dissolved oxygen in the boiler feed water may be mechanically removed with sodium sulphite and theoretically, 8 parts of sodium sulphite are required for each part of dissolved oxygen. Customary practice is to maintain an excess of 20 to 30 p.p.m. of sulphite in the boiler water to be certain that sufficient is present at all times to react with dissolved oxygen present in the boiler feed water and prevent corrosion and pitting in the boilers.

INTERNAL CONDITIONING

Soda Ash

Soda ash was one of the first chemicals to be employed for internal correction of boiler water. The following reactions take place when soda ash or sodium carbonate is employed:

1) $Na_2CO_3 + CaSO_4 \rightarrow CaCO_3 + Na_2SO_4$
2) $Na_2CO_3 + HOH \rightarrow 2NaOH + CO_2$

Dependence is placed on the first of these two reactions for precipitation of the calcium sulphate present in the incoming feed water. The resulting product, calcium carbonate, is somewhat crystalline in nature and can deposit in the form of a scale of its own, in fact is one of the most common constituents of boiler scale. The scale formed, however, is softer than a calcium sulphate scale. Proper internal conditioning of boiler water will provide for an environment in which crystalline precipitates can readily form a fluid flocculent sludge that will be non-adhering to evaporating surfaces, that will not interfere with surface tension to cause a carry over, and that can be easily removed by means of the blow down.

It is obvious that if reaction No. 2 proceeds with any degree of rapidity, that considerably larger than theoretical quantities of soda ash will be required to properly precipitate the calcium sulphate in a given boiler feed water. This hydrolysis has been found by Straub *(1)* to range from 50 to 60 per cent in the case of lower pressure boilers to as high as 90 to 95 per cent in higher pressure boilers. In fact, he calculated in one test that at 1,500 pounds pressure, 43.5 pounds of sodium carbonate per 1,000 gallons would be required to maintain a soluble carbonate ion concentration in the boiler water of 30 p.p.m. His research further pointed to the fact that a minimum of 30 p.p.m. of the soluble carbonate ion should be maintained to prevent the possible formation of a calcium sulphate scale. The rate of hydrolysis to sodium hydroxide is directly proportional to the operating temperature or pressure, and proportional to the rate of evaporation and inversely proportional to the partial pressure of the carbon dioxide in the steam space. Carbon dioxide liberated in the steam will give the steam an acid reaction and may set up corrosive characteristics in return condensate lines or possibly even in the turbines. The high concentrations of caustic alkalinity resulting from the hydrolysis are most undesirable, giving rise to tendencies to carry over and making more difficult the maintenance of proper sulphate to alkalinity ratios for inhibition of intercrystalline cracking.

Phosphates

Phosphates have been used for conditioning boiler feed water for a number of years, and in fact, their use is reviewed as early as 1886 *(2)*. The phosphates commonly used for correction of boiler feed water are mono, di or trisodium phosphate, orthophosphoric acid, the pyrophosphates and sodium metaphosphate. With the maintenance of the proper degree of alkalinity in the boiler water it should be kept in mind that regardless of the phosphate employed; i.e., regardless of the form in which the phosphate is introduced, the final product in the boiler is tricalcium phosphate $Ca_3(PO_4)_2$. The only difference in results in the boiler is the possible effect on the alkalinity of the boiler water depending on which phosphate may be employed inasmuch as the resulting precipitate of tricalcium phosphate is in exactly the same form in each case. It is, therefore, readily apparent that the best form in which to introduce the phosphate is that form which will give the most economical source of phosphate, evaluated as P_2O_5. Inasmuch as this active phosphate content will vary from as low as 18.6 per cent to as high as 69 per cent in the various phosphates, this factor must be properly evaluated in each case.

Control with phosphates is dependent on the maintenance of residual phosphate ion concentration in the boiler water and this is normally specified to range from approximately 30 to 100 p.p.m. as PO_4, depending on the individual conditions. Where the concentration of solids to be precipitated in this form are high, considerable crystalline sludge results which may interlock and form a scale of its own. High concentrations of soluble phosphates are known to aggravate carry over of solids with the steam. Phosphate possesses a distinct advantage over the use of soda ash, however, in that there is no hydrolysis of the phosphate ion under elevated temperatures.

Colloids

A somewhat different class of materials finding extensive application in the internal correction of boiler feed water are principally organic and may be classified as colloids. The colloids used in water purification can be further classified as reactive types of colloids and protective types of colloids *(3)*. Tannins and starches belong to a class known as protective colloids. There is no action of calcium or magnesium on tannin in as far as a precipitation reaction is concerned. A protective colloid protects various intercrystalline precipitates formed in boiler water by attaching to the particle of the precipitate, acting in this manner to prevent crystals from adhering to heating surfaces when settling from solution. The reactive type possesses the additional ability to react with and remove from solution various incrusting solids such as calcium and magnesium. It is not to be implied that a straight chemical reaction can be written showing a given molecular or polymolecular weight of colloid reacting with a given molecular weight of calcium or magnesium, or in other words, that the reaction proceeds in stoichiometric fashion. The important point is that the reaction does not proceed in stoichiometric fashion and that the ratio is variable and for this reason can best be termed a colloidal reaction.

Simply because the reactions involved and the values to be obtained do not lend themselves to explanation in simple chemical formulae, it was assumed by a number of leaders in the field of water purification that organics had little or no value. Many of these same leaders have been forced to the use of organics to overcome the shortcomings of inorganic where inorganics were used alone on certain types of water.

It is not to be assumed that organics are a panacea or cure-all in the correction of boiler feed water, but they definitely have their place when used and controlled by those versed in an understanding of their fundamental values.

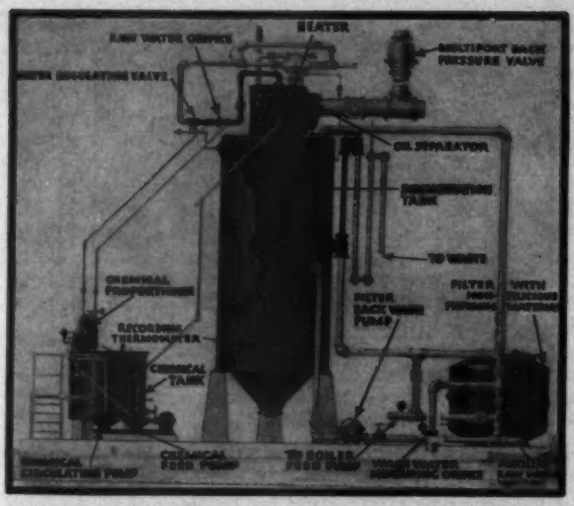


Figure 2—Diagrammatic view of hot process water softener.

The reactive type of organic colloid forms a gel in the reaction with calcium and magnesium ions and by virtue of the enormous surface exposed, possesses the ability to remove suspended solids to a high degree. Such colloids are seldom used alone, but rather in conjunction with other precipitating agents, usually the phosphate not only for the softening value of these agents but also for the peptizing value on the colloid sol. This value of adsorption of suspended solids from solution has proven particularly advantageous in the solution of boiler feed water problems where serious carry over was experienced and in one particular case cited by Maguire and Topolosky *(4)*, where phosphate conditioning alone was of little value.

Colloidal metallic iron has been suggested for use in the correction of boiler feed water, its principal value claimed to be a reduction of dissolved oxygen and through the formation of hydrous oxides, acting as a flocculating agent. In some cases, it has definitely proven to be of less value than sodium sulphite for dissolved oxygen removal and there is a question

Table III

PARTS PER MILLION	Raw	Zeolite Softener	Boiler Feed Water	Boiler Water A	Boiler Water B
Turbidity as SiO_2	S. Trace	None	None	S. Trace	S. Trace
Suspended matter	Present	None	None	Trace	Trace
Carbonate Hardness (as $CaCO_3$)	252	0	0		
Non-Carbonate Hardness (as $CaCO_3$)	72	0	0		
Total Hardness (as $CaCO_3$)	324	0	0	0	
Sulphates (SO_4)	80	80	58	926	413
Chlorides (Cl)	3	3	2	32	14
Iron (Fe)	Trace	None	None	None	None
Free Carbon Dioxide (CO_2)	11	11	1		
Bicarbonates (as $CaCO_3$)	252	252	200	0	0
Carbonates (as $CaCO_3$)	0	0	0	640	286
Hydrates (as $CaCO_3$)	0	0	0	2560	1140
pH Value	7.7	7.7	8.2	12.2	12.0
Sulphate Chloride Ratio (SO_4/Cl)					
Sulphate Carbonate Ratio (Na_2SO_4/Na_2CO_3)				0.4	0.4
Per Cent Blow Down				6.2	13.9
Oil					
Total Solids, p.p.m.	521	531	425	4152	1900

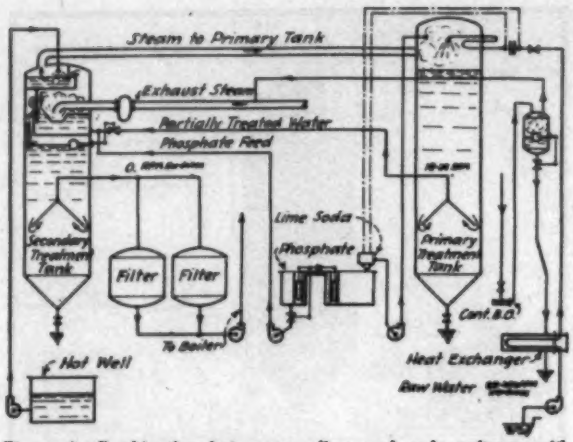


Figure 3—Combination hot process lime and soda softener with external phosphate treatment.

if the same type of floc could not be obtained by the introduction of ferrous sulphate.

Sodium Aluminate

Sodium aluminate has been used internally in the correction of boiler feed water and will react with soluble magnesium to form insoluble magnesium aluminate, a gelatinous precipitate the acts as a floccing agent to form a fluid sludge. The principle value of sodium aluminate in water correction is in its ability as a coagulant in external cold process lime and soda softening.

FOAMING, PRIMING AND CARRY OVER

In a recent publication, Powell *(6)* completely and comprehensively covered the present day knowledge on the subject of foaming, priming and carry over. Professor Foulk of Ohio State University has been one of the leading research workers in this important field. The mechanical design of the boiler itself is perhaps the most important factor influencing the tendency to carry over of solids with the steam. Pure liquids will not foam. There is a tendency for either positive or negative adsorption of both dissolved and suspended solids into the film of a liquid and the net effect of this phenomena determines to a large degree whether or not foaming will occur with a given boiler water and to what extent.

The nature of the dissolved or suspended solids or the presence of oil will all have some effect on the tendency of the given boiler water to foam. The rate of evaporation from a boiler will also have a distinct effect on the tendency to foaming.

The best method of measurement of carry over of solids with the steam is by means of conductivity. Such measurement, however, should be properly compensated for any carbon dioxide and ammonia content of the steam and careful control of the temperature is necessary for proper results.

CAUSTIC METAL EMBRITTLEMENT

Caustic metal embrittlement or what may be more properly termed as intercrystalline cracking is caused by high concentrations of caustic alkalinity in a boiler water in the presence of silica and in the absence of other materials which may act to inhibit this corrosion. At the present time the American Society of Mechanical Engineers recommends the maintenance of certain ratios of soluble sulphate to total alkalinity for the prevention of intercrystalline cracking of boiler metal, but recent research has shown that these ratios may be open to question and further that a number of other materials possess the property of inhibiting this reaction in certain temperature ranges. This highly important subject has been so extensively covered by recent literature describing the work of Dr. Schroeder under the auspices of the Joint Research Committee on Boiler Feed Water Studies and also by Professor Straub as to preclude the necessity for extensive discussion in this paper.

CORRELATION OF EXTERNAL AND INTERNAL TREATMENT METHODS

It is apparent from the various methods of treatment discussed that "what is one man's food is another man's poison," or in other words, the system of water correction to be employed must be prescribed for the individual case, taking into consideration the desirability for external treatment where indicated, the price of external treatment, the cost of internal treatment and the final results to be obtained. An examination of many of the larger modern high pressure plants that are being installed will reveal the fact that more and more space is being required for water treating equipment, and in some plants as much space for the water treating equipment as for the boiler itself. This being the case. it is apparent that the proper time to consider what method of water treatment should be employed is at the time the plant is first being designed on paper, not waiting until the boiler plant is completed and then putting in water treatment equipment in whatever space may be left. A new boiler plant should be properly equipped with sampling devices, permitting samples of boiler water to be readily obtained, these preferably being by means of taps in the drums and a line to a cooling coil so that the sample may be taken without flashing. Sampling cocks should be installed on the effluent lines from filters, softeners and feed water heaters. Sampling points should be provided for both saturated and superheated steam and located in the steam line in such a manner as to obtain an average sample of steam. Such sampling lines must of necessity pass to condensing coils.

Control of the water treating plant is a vital function of the operating plant as a whole and particularly is this true in the higher pressure stations. The number of tests that should be made, the frequency of the tests, and the final evaluation of reports should be placed in the hands of specialists in this line and will be dictated entirely by the conditions to be encountered. The tests may require as little as one-half hour per day to as much as three man days in twenty-four hours, one on each shift, whose sole duty is control of the water conditioning. Such control was found necessary in a plant where the hardness of the raw supply would change as much as 150 p.p.m. in the space of four hours. Such plant tests will not only indicate the quantity of chemicals necessary to hold the proper chemical balances, but will also be used to indicate the amount of blow down required. Blow down may usually be gauged by the chloride concentration of the boiler water, the relation of total solids to chlorides as a rule remaining fairly constant.

Several examples may be cited to illustrate the various points discussed under this heading. A fiber plant with boilers operating at 250 pounds pressure and evaporating 80,000 pounds steam per hour had available as a raw supply a filtered water and the record of analysis over a considerable period of time showed it to be fairly constant in its content of solids. Internal correction with phosphate and organic colloid had proven fully satisfactory. This plant was modernized and a 625 pound pressure boiler installed. There was very little returned condensate available in the low pressure plant and no improvement was expected in the amount of returned condensate received with the installation of the high pressure boiler. It was, therefore, recommended that a zeolite softener be installed operating on the raw water, the effluent from the zeolite softener treated with sulphuric acid and fed to an aeration tank with the carbon dioxide released by the action of the air blown through the water. The effluent from the aeration tank is pumped to the feed

water heater and then to the boiler. Reactive colloid and phosphate is pumped directly to the drum of the high pressure boiler for removal of any residual hardness and prevention of any possible silica scale. By aeration following the addition of sulphuric acid, the pH value of the water pumped to the heater is raised to 7.2 and the aeration serves as an additional factor of safety on the acid treatment in acting as a buffer to prevent momentary overdoses of acid. The alkalinity of the effluent water is held between 9 and 12 p.p.m. and excess alkalinity in the boiler water is thus prevented. Addition of the sulphuric acid and reduction of alkalinity has resulted in the maintenance of proper sulphate to alkalinity ratios for inhibition of intercrystalline cracking. Typical analyses from this system as in present operation are shown in Table I.

In another case, a paper plant operating on low boiler pressure of 150 pounds planned the installation of a 750-pound boiler plant. On the low pressure plant, a hot process lime and soda softener was employed with subsequent internal treatment. It was determined, however, that this softener would not prove sufficiently large to properly take care of the requirements of the new plant. After a careful study of the problem, a lime and soda softener was specified of sufficient size to soften all of the heavier requirements and the tank that had been employed for the lime and soda softener was converted to a secondary phosphate softener, taking the effluent from the primary lime and soda unit, and completing the softening by external phosphate. The effluent from the secondary tank carries a small amount of residual soluble phosphate, sufficient to maintain soluble phosphate concentrations in the boiler water and no internal correction is required in this case. As a point of illustration, a zeolite softener would have been out of the question on a water of this character. Typical analyses are given in Table II from the plant. In Table III analyses are given showing the type of water that would be delivered from a zeolite softener, had one been installed, and the resulting alkalinities in the boiler. Excessive blowdown in the boiler would have been the net result and without question, it would have been impossible to secure a clean steam, even with an excessive blow down. Boiler water A is calculated with the same degree of concentration as given on the boiler water from the lime and soda-phosphate treatment and total solids calculated to 4152 p.p.m. compared to 1898 with the system of treatment in use. Boiler water B shows the concentrations that would result if the total solids were held to approximately 1900 p.p.m. and would require 13.9 per cent blowdown as compared with 6.2 per cent actually maintained.

The viewpoint of the specialist, as interested only in the proper solution to the problem, and not interested in the sale of any equipment or any single method of treatment, can prove most valuable in the proper evaluation, plant design and supervision of modern day boiler feed water problems.

Part 1 of this article appeared in the June, 1938 issue of this magazine.—*Editor's Note.*

Literature Cited

1) Straub, S. G. and Larson, R. F. "Decomposition of Dilute Sodium Carbonate Solutions at Temperatures Between 147° and 243° C." *Ind. and Eng. Chem.*, v 24, p. 1416, (December, 1932).
2) Laudig, J. J. et. al. "The Use of Phosphates in Water Treatment." *Am. Ry. Eng. Assoc. Bull.* 3889, p. 97-101 (1936).
3) Betz, L. D. and Sheen, R. T. "Application of Colloidal Chemistry to Boiler Water Conditioning." *Combustion*, May, 1936.
4) Maguire, J. J. and Topolosky, J. T. "Boiler Water Treated to Prevent Carry Over." *Power Plant Eng.*, June, 1937.
5) Powell, S. T. "Steam Contamination." *Combustion*, Sept., Oct., and Nov., 1937.

A High School Course in Papermaking

EDWARD N. WHITTINGTON, Vice Principal

West Carthage High School

PROMPTED by a desire to further the expansion of the Industrial Arts program of the State of New York, the author, four years ago, began a preliminary investigation to determine the feasibility of offering high school instruction in the field of papermaking. This desire resulted from observation as a high school teacher in the Black River District of Northern New York, a region in which the papermaking industry furnishes a major source of income, and from a feeling that youth of the community should be offered some insight into the industry as a background, perhaps, for their later connection with it.

This investigation consisted of a survey of the community of Carthage and West Carthage, a community of approximately 7,000 people, and of several neighboring villages to ascertain what percentage of the wage earners of the families represented by students was employed in the manufacture of paper. The investigation revealed that thirty per cent of the wage earners included by the survey in Carthage and West Carthage earned their livelihood by direct employment; while, in such neighboring villages as Herrings, Deferiet, Beaver Falls and Great Bend, the figure was practically 100 per cent.

The result of the survey, convincing evidence of the importance of the industry to the locality, led to a consideration of problems regarding what subject matter to teach in such a course as contemplated, when to teach it, how to teach it, and to whom it should be taught. Only after data based on numerous interviews with men in the industry and with school executives, and then with the aid of T. E. Loessi, Chief Chemist, Latex Fiber Industries, Inc., Beaver Falls, was a plan covering a course of study set up.

This plan was submitted to a number of men in the industry for comment and later revised with the help of C. E.

Libby, Professor of Pulp and Paper Manufacture, New York State College of Forestry, Syracuse, N. Y.

Approval of the revised plan then was obtained from Roy G. Fales, Supervisor of Industrial Arts of the State of New York. In sanctioning it, Mr. Fales simply insisted that the course thoroughly meet the objectives of the Industrial Arts program. These objectives are four-fold: (1) To develop interest in avocational activities of an industrial character through construction of projects which bring out the principles of the course to be taught; (2) to develop ability in the use of common tools which will function in daily activity; (3) to increase knowledge of industrial projects and processes, and to provide an opportunity for creative expression and problem solving through the medium of tools and materials; and (4) to motivate and increase knowledge about the major fields of industry and the educational and occupational opportunity related hereto through study and shop practice, and to explore the boy's inclinations, interests and abilities in occupational pursuits.

Following the approval of the plan by Mr. Fales, it next was necessary to obtain approval of the Board of Education, which was obtained by Principal F. J. Salter of the West Carthage High School.

The approval of the plan by the Board of Education gave rise to the problem of obtaining necessary equipment to carry out the course of study. School funds did not permit of the expenditure, so co-operation was sought by the author of the local mills, which, in addition to the usual miscellaneous supplies, donated a 1 lb. laboratory beater, hand molds and deckles, screening for molds, felts, a letter press, tubs for vats, ream weight scales, an Elmendorf tester, a Mullen tester, a tensile tester, a pulp testing mold, a hydraulic press, a screen for screening groundwood, two Densometers, and a laboratory wet machine.

The total outlay of the school for equipment amounted to approximately 200 dollars and this sum covered the purchase of a freeness tester, the building of work benches, plumbing, and a few other odds and ends.

The course as now organized will be offered for the first time in September, 1938, by the High School at West Carthage, New York. It will require 90 minutes a day, 5 days a week, for the school year of 40 weeks on the part of each student who elects to take it. During this time, each student will perform the following operations: Fill a beater with waste paper, beat waste paper stock, drop a beater, store stuff, make a hand sheet mold, make a deckle, form a sheet on hand mold, couch a sheet, post a series of sheets, press a post of sheets, separate sheets from felt, pile moist sheets, press finish sheets, spur sheets, dry sheets, calender sheets, trim sheets, use ream weight scale, compute ream weight from grams or pounds, use caliper gauge, compute density of stock, select wood for grinding, add sulphite to stock, grind

Students installing laboratory wet machine and beater.

Students at work in laboratory. Instruments, left to right—dryer, densometer, oil penetration tester, freeness tester, tensile tester and hydraulic press.

wood, screen groundwood, beat news stock, body paper with clay, use Elmendorf tester, use Mullen tester, use tensile tester, beat sulphite pulp to freeness or slowness, beat for various tests, size in beater with rosin, tub size with gelatin or other size, test degree of sizing, beat soda pulp, bleach soda pulp in beater, bleach various pulps, wash stock, make sheets on pulp testing mold, press sheets in hydraulic press, dry sheets on cylinder dryer, beat stock with meat grinder, cook rags with caustic soda, beat cooked rags or half stuff, dye rag stock in beater, dye on calender stack, beat bleached sulphite pulp, coat various papers with various coatings, make a linen finish paper, determine various grades of paper, watermark by indentation, watermark by raised wire, figure beater formulas, figure machine tonnage, figure machine sheet size, match a color, test effect of age on various papers, test fading of various dyes, operate wet machine and visit a paper mill.

A total of 72 lessons will be devoted to the course; and about 25 per cent of the allotted time will be devoted to related lesson topics. Likewise, all through the course, whenever possible, a correlation will be made between it and other subjects offered in the school. These other subjects include: Design, Interpretation of Mechanical Drawing, Shop Sketching, Mathematics, Economics, Science, Geography of Transportation, History, Consumer Value, Occupational Information, Sociology, and Safety and Hygiene.

Although principally designed for offering in communities where papermaking forms a major source of income, the course need not be restricted to such communities. It could be included in any school curriculum where an Industrial Arts program is in effect; and would be well worth the time and expense necessary to teach it. Woodworking, Metalworking, Electricity, Ceramics, Automobile Mechanics, and many other major industrial subjects are taught on an Industrial Arts basis in schools throughout the country. Why not Papermaking?

Acknowledgment

The author wishes to express his gratitude to T. E. Loessi, Chief Chemist, Latex Fiber Industries, Inc.; C. E. Libby, Professor of Pulp and Paper Manufacture, New York State College of Forestry; A. F. Owen, General Manager, Latex Fiber Industries, Inc.; H. G. Beyer, Payne Jones, Inc.; H. Perry, Chief Chemist, J. P. Lewis Co.; F. M. Williams, President, Williams Apparatus Co.; W. Ronald Benson, Chief Chemist, National Paper Products Co. (Carthage Division); Fred Lanphear, Chief Engineer, J. P. Lewis Co.; and to others too numerous to mention. Without their aid, it would have been impossible to organize the course in Papermaking as described in this article.

PAPER SKETCHES

CENTURIES

AFTER THE TRIP-HAMMER METHOD OF MACERATION HAD BEEN INVENTED BY THE ARABS AND INTRODUCED INTO ASIA, THE CHINESE AND JAPANESE WERE STILL FOLLOWING THE OLD, LABORIOUS PRACTICE OF HAND-BEATING PULP. THE JAPANESE CLUNG TO THIS OBSOLETE PRACTICE AS LATE AS THE 18TH CENTURY.

FINE QUALITY PIANOS,

DECORATED BY MASTER ARTISTS, WERE MADE OF COMPRESSED PAPER BY A FRENCH MUSICAL INSTRUMENT MAKER IN THE 1880'S. ONE OF THESE PIANOS WAS PURCHASED BY THE ENGLISH DUKE OF DEVONSHIRE.

PAPER TOWELS

ARE SAID TO HAVE BEEN USED AS EARLY AS 1887 TO DRY WOUNDS IN THE SURGICAL DISPENSARY IN PHILADELPHIA.

SULPHITE MILLS OF MAINE, NEW HAMPSHIRE AND NEW YORK ACCOUNTED FOR 36% OF THE U.S. CAPACITY IN 1935; THOSE OF WASHINGTON AND OREGON, 29%; AND THOSE OF WISCONSIN AND MICHIGAN, 22%. MILLS IN SEVEN OTHER STATES MADE UP THE REMAINING 13%

Evaluating Beating Equipment Efficiency

H. D. COOK, Superintendent
Sweet Bros. Paper Mfg. Co., Inc.

This article is the plea of a paper mill superintendent to the technical leaders of the industry to evolve and establish some workable means of evaluating efficiency of beating equipment.

THE salesman offers a centrifugal stuff pump for which he claims a capacity of 50 tons per day of 3 per cent stuff. He may state its hydraulic efficiency and suggest that, under the proposed operating conditions, it will require a 10 horsepower motor of stated r.p.m.

If he has claimed more for his pump than it will do, the fact will become evident as soon as it is placed in service. Its purchase price, construction and operating cost then can be considered on a basis of sound engineering principles and information in relation to plunger pumps and other offerings.

The same salesman also may offer a jordan engine, refiner or new continuous beating engine for which he claims, without bothering to specify 3 per cent stuff, a capacity of 50 tons per day at a possible power requirement of 150 hp. When cross-questioned as to what he means by a capacity of 50 tons per day, it develops that the machine can be used in series with a paper machine which has a capacity of 50 tons per day.

Since the refining machine, in a sense, is a centrifugal pump, there is some reason to believe that the salesman is making the same claim for it that he did for his pump. Each claim, on the face of it, is the same. Yet the refining equipment would not be considered for use where a pump is required—nor would a pump be used to condition stock.

Admitting that the refining machine is a pump and disregarding differences in operating head, what then of the 140 extra horsepower required to operate it?

The salesman is not able to state what his refining machine will do to a ton of stock with a horsepower-hour or kilowatt-hour of energy. Neither can he be advised of how much work is expected to be done on a ton of stock by a kilowatt-hour or what kind of work is desired in any exact manner.

Means of measuring slowness-freeness was developed to control the beating process and has been used for that purpose. By preparing stock to the same slowness with the same equipment day after day, more nearly uniform papermaking conditions can be maintained and more uniform quality of paper produced. Unfortunately, there are several ways of measuring slowness-freeness, all useful but no one way preferred by a decided majority of operators or technical men.

The author prefers the sedimentation type of tester which is most popularly represented by the Williams Precision Slowness tester. Plotted readings of tests made with this type of tester are more nearly a straight-line function of the energy used than those of the divided funnel type of tester, making it unnecessary to deal with exponents or reciprocals. This measure of the work done on the stock increases as energy is used in doing the work and is roughly proportional to the amount of energy used. It appears then that arithmetic trouble, or worse, will be avoided if the sedimentation type of test to measure the work done on stock is correlated with the energy requirements of beating.

The first proposal, then, is how many kilowatt-hours are used to increase the slowness test of a ton of stock one second. That appears to be a measure of what a unit of energy actually does in beating stock. In other words, the comparison unit for beating machines might be kilowatt-hours per ton per second slowness change. This unit sounds complicated; but is no more so than kilowatt-hours used per foot pound of work accomplished—a unit of measure of efficiency for any power tool.

If pulp were only uniform in its resistance to beating, and if a beating machine only had to increase slowness of stock, there would be little objection to the use of this method of comparison. These two "ifs", however, upset the accuracy of this measure of efficiency. Nevertheless, if desired, one factor could be held under control by specifying the kind of stock beaten, even specifying a particular brand as "Brown's No. 20 Alpha" or "Solka" which run comparatively uniform in beating resistance. The concept that slowness can be developed mechanically and still produce a stock whose properties are not desirable for paper making is harder to control. It is necessary to assume that the machines being tested and compared are beating stock of acceptable character; or if writing specifications, for example, that the machine must produce stock suitable for the manufacture of bond paper and use not over 3.0 kilowatt-hours per ton of Mount Tom sulphite per second of Williams slowness developed thereon. There is at least one manufacturer of beating equipment who is ready to consider such specifications.

Admitting that these two variables seriously detract from the accuracy of the proposed method of measuring beating power efficiency, a poor tool must still be used if it is the best available. At the worst, one variable which exists in the prevailing method of comparing beating machines has been eliminated. If the salesman's statement that his refining machine requires 150 horsepower and is conditioning 50 tons of stock per day for So-and-so is accepted, we wonder how So-and-so beats his stock because we know that one superintendent may consider it necessary to hydrate his stock a great deal more than his neighbor to produce the same grade of paper. This used to be called the personal equation, a term which seems to be less popular now than it was a decade or two ago, but just as disturbing as ever. At best, the variation has been tied down to that existing in the most uniform stock which can be specified. If beating equipment is selected with judgment, disturbed only by this variable, it is a practically scientific procedure by comparison with judgments disturbed by the usual multitude and magnitude of factors.

The author has used this method of comparing beating equipment on the basis of power efficiency for several years with some interesting results. Some of these comparisons may be tabulated as follows:

	kilowatt hour per ton per sec.
Certain beaters on book stock	3.38
Different make hollander beaters on tissue	3.33
Other beaters on book	3.5-9.3
Beaters and jordan combined	2.4
Jordan on bond	1.82
Jordan on book	.68 to 2.58
Same jordan, but sharper tackle, on book	.40 to 1.41
Other jordans on book	.70 to .89
Other jordans on book (avg/12)	1.21
Additional power used by submerging jordan to produce extra slowness	.517
New beating device (experimental)	27.00
Claimed for another beating device in use	.675
Conventional refiner at machine on tissue	2.95
New design refiner at machine on tissue	4.00
New design refiner at machine on waxing tissue	2.04
Small jordan at machine on waxing tissue	1.21

The figures in the tabulation indicate roughly that the jordan type of beating machine is twice as effective in the use of power to produce slowness in stock as is the hollander type of beater. This indication supports the modern trend toward the use of such equipment in preference to the hollander for reduction of fiber—the hollander being more and more confined to the reduction of laps and broke to fiber. The movement, however, is resisted by those who believe that stock can only be "cut" in jordans or jordan-type machines; and, while that leads to another interesting subject, it is pertinent here because it really matters little how cheaply slowness is produced if it does not produce useful stock.

Sharper tackle produces slowness more cheaply, but that also has to be argued as to how far it is useful. When measured by this yardstick, the new ideas do not show up so well.

Two new devices are in use because, like the hollander, they have other functions beside the production of slowness which make them desirable. The experimental device for which 27 kwh. per ton per sec. is listed was a laboratory machine based on an entirely new principle. The large indicated waste of power helped to form judgment on its prospects as a research investment.

Air dry shrinkage and change in strength tests also can be used as a measure of the work done in beating. Such factors, however, are not preferred for this purpose by the author because strength tests do not react as consistently to beating as do slowness tests and air dry shrinkage is difficult to determine accurately. It is also impossible to collect data on air dry shrinkage because it is so little used. It is not so difficult to collect records of power readings and slowness tests from other mills, laboratories and equipment manufacturers, and thus compare performance and equipment.

Cellulose Research, 1933-37

A Resume PART I—MOLECULAR WEIGHT OF CELLULOSE

LOUIS ELSBERG WISE, Ph. D.

IN 1937, the German Association of Pulp and Paper Chemists and Engineers bestowed on Professor Freudenberg the Alexander Mitscherlich Memorial Medal. In 1933, this same Karl Freudenberg, Professor at Heidelberg, had written a comprehensive monograph (*1*) in which (on page 105) he outlined some of the essential data on the constitution of cellulose. In the following preamble, the present reviewer has abstracted the resumé given by Freudenberg, whose work should be consulted for authors and literature references.

In 1921, it was shown that cotton cellulose, on complete hydrolysis with acids, yielded glucose quantitatively; that in the original cellulose each glucose unit contained three hydroxyl groups; that controlled acetolysis gave 60 per cent cellobiose (of which only about 40 per cent was recovered as the octaacetate); and that the configuration of each anhydroglucose unit was identical with that of every other anhydroglucose unit in the cellulose molecule. In other words, cellobiose groupings characterized cellulose, and this characterization was in harmony with X-ray data. In 1923, it was demonstrated that complete methylation of cellulose followed by hydrolysis *appeared* to give only 2, 3, 6-trimethyl glucose, which meant that one anhydroglucose unit could be joined to its neighbor only through positions 1, 4 or 5. In 1926, using Haworth's discovery of the pyranose structure of glucose, a periodicity of 10.2 Angstrom units in the longitudinal axis of the cellulose molecule became evident. This accounted almost exactly for the length of two glucose units.

The cellulose molecule then was a chain made up of such (anhydrocellobiose) units joined within the chain by primary valence, and held in close proximity to a similar, parallel chain by lateral, secondary valence forces. In 1926, also it was shown that trimethyl cellulose chars but does not melt on heating, and the chemical constitution of cellobiose, as a dextro-4-beta-glucosidoglucose was elucidated.

In 1928, a *trimethylglucose* anhydride was synthesized, which could be distilled and which was certainly very different from trimethyl cellulose. In that year, too, and in 1929, a so-called "biose anhydride," obtained from cellulose as the acetate, and believed until then to be a small molecule, was shown to be a mixture ranging in magnitude somewhere between cellulose and glucose. Evidently this biose anhydride was not cellulose but a series of degradation products. This disposed (for most chemists, at least) of the idea of a small cellulose molecule aggregating to form a micel.

In 1929-1930, cellotriose (a sugar containing three anhydroglucose units) and a cellotetraose (containing four such units) were further studied. Both were degradation products of cellulose. In 1930 the kinetics of cellulose hydrolysis was explored iodometrically and optically, and the conclusion was reached that only cellobiose linkages were present in the chain molecule. In 1932, a large quantity of completely methylated cellulose was hydrolyzed cautiously and a small quantity of crystalline 2, 3, 4, 6-trimethyl glucose was isolated and determined. This furnished a means of

chemically determining the chain length of cellulose. The estimate, by finding the ratio between the tetra and the trimethyl glucoses, was that originally, the molecule of cellulose contained 100-200 anhydroglucose units.

This brings us to the threshold of 1933, and it is well to remember, however, that Freudenberg has approached the subject largely from the viewpoint of the organic chemist, and that there are other vistas that must be viewed. Were it not for a remarkable publication by Stamm (*2*) it is doubtful whether the present author would have the temerity to attempt a survey of a few of the more interesting phases of cellulose chemistry since 1932. Of Stamm's 280 critically-chosen literature references, 65 cite work published in 1933-5; and in the following review, the author is glad to acknowledge his indebtedness to Dr. Stamm, who is one of the most brilliant and prolific workers in the field of cellulose research.

In 1930 Meyer and Mark (*3*) concluded that the cellulose micelle was a definite bundle of long cellulose molecules, held together by secondary valence forces. These were often spoken of as "crystallites." Other investigators, however, (*4*) have presented evidence or hypotheses that these may be due to chance groupings rather than to *regular* crystalline structure, and that minute cleavage planes may separate the cellulose chain molecules at certain intervals. This would mean a crystalline structure for cellulose within certain regions, and an amorphous cellulose within other regions. Investigators have come to speak of the "crystalline part" of cellulose. And quite recently this crystalline portion has been reinvestigated. Kurt Meyer and L. Misch (*5*) have reiterated the fact that it is in the solid state that the atomic and molecular groups in cellulose are of the greatest importance. A study of this state involves molecular morphology, or the spacial arrangement of atoms in molecules, molecules in micelles, and of the latter in the fibrils that make up the fiber. In earlier papers, Meyer and Misch had believed that within the micelle all anhydroglucose linkages ran in one direction. In other words, that all completed chains of cellulose have an identical pattern. This view has been revised, since hydrated cellulose prepared from rayon and hydrated cellulose formed directly from ramie with NaOH both have the same crystal lattice. In the solution prior to rayon coagulation, the crystal lattice has been destroyed, and it appears improbable that all the chains lie in the same direction after coagulation. On purely statistical grounds, Meyer and Misch believe that as many chains run "up" as run "down" the crystallite. This theory has been carried over to unmercerized, native cellulose, and a new cellulose model (See Figure I) with two parallel chains running in opposite directions seems to be in harmony with experimental crystallographic data. In the new model, the observed intensity of interference agreed well with the calculated values, and the new basic cellulose unit (See Figure I) is probably more nearly correct than was the old one. The authors are fully aware of the limitations of the X-ray data in determining the size of micelles and the constitution of cellulose.

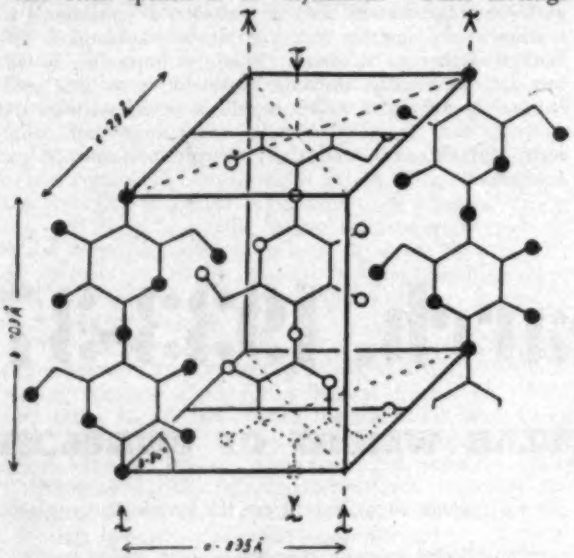


Figure 1.

This new tridimensional model for the cellulose unit is really based on a carefully devised model for cellobiose, in which the angles and interatomic distances are in close agreement with those actually found experimentally. The parameters of the atoms were determined by the relative intensities of the X-ray interferences. This has been discussed by the same authors in another paper (*6*). Staudinger (*7*) and his co-workers are the outstanding protagonists for the theory that in dilute solutions the long chain molecules are themselves entirely separated from any bundles or aggregates. In fact, very recently Staudinger (*8*) claims that only when cellulose is in the solid state can cellulose micelles or crystallites exist.

What is the length of these giant, chain molecules of cellulose? The answer is that we do not know. Numerous different types of measurement have been used, and the results vary anywhere from 500 Angstrom units to well over 15,000 such units. It is also highly probable that any of the values obtained by the various methods represent average molecular chain lengths, and that the treatment prior to the molecular weight determination plays a decisive role. In any event, the full grown cellulose chain is very long when compared to its width. Before discussing the recent work on the length (and width) of this molecule let us re-emphasize the recurring structural group in cellulose. It is the anhydrocellobiose which, in its simplest terms is shown recurring (in brackets) in Figure II, based on the work of Haworth (*9*). The assumption is that there are carbon atoms at five corners of each hexagon, and that the term *n* varies, depending on the chain length determination (or the material under investigation) anywhere from about 50 to about 1500.

Some years ago Herzog and Jancke (*10*) found as the *micellar* weight of cellulose, by X-ray determinations, the figure of 1,000,000. Here, however, the chains appeared to be only 500 Angstrom units in length (i.e., about 50 anhydrocellobiose linkages). Much later, by means of the sedimentation equilibrium, in the ultra-centrifuge, and using cuprammonium solutions of cellulose, Kraemer and Lansing (*11*) found a *molecular* weight of 200,000 to 300,000, which was much higher than Stamm's sedimentation equilibrium data obtained some eight years ago (*12*). By using the so-called "Farr particles" (*13*), and the same technique, Kraemer (*14*) found molecular weights of about 50,000, which are more in harmony with Stamm's results. These particles or "ellipsoids" as they are termed, may have suffered some chemical degradation during their isolation. While Kraemer and Lansing believe that ultra-centrifugal analysis is the most reliable means of obtaining molecular weight data for a non-uniform material like cellulose, Ulmann (*15*) has criticized this technique, which, in its original form, he claims is not well suited to cellulose. Whatever the merits of Ulmann's criticism, Kraemer and Lansing have given an exceedingly important critical resumé of the methods now used in determining molecular weights of cellulose and have tabulated the data of all the important investigations prior to their own. They stress the molecular non-uniformity of cellulose, and more especially its esters.

From viscosity measurements on cuprammonium solutions Staudinger and his co-workers (*5*) have arrived at very

high chain lengths for cotton cellulose. Stamm (*2*) quoting Staudinger, cites a chain length of 3900 Angstrom units, corresponding to a molecular weight of 120,000. More recently Staudinger (*16*) has presented viscosity data indicating that 2000 or more anhydroglucose units may occur in the native cellulose molecule. The number of these anhydroglucose units he has—unfortunately—called the "degree of polymerization" (d.p.) A "d.p. of 2000" would mean 999 anhydrocellobiose units. In other words, in Figure II, *n* would be 999, and the average molecular weight would be well over 320,000. However, Staudinger's cellulose molecule seems to be elongating still further. Late in 1937 he and Rolf Mohr (*17*) reporting viscosity and osmotic pressure measurements on cellulose nitrate solutions (made from cotton and flax) state that the d.p. is at least 3000. Such molecules would have molecular weights of over 480,000, and should be about 1.5 microns in length. Kraemer and Lansing have also determined viscosities in very low concentrations, and have calculated intrinsic viscosities and the respective d.p.'s. They determined the molecular weights of these same cellulose samples (or cellulose derivatives) by use of the ultra-centrifuge. The ratio:—[d.p./intrinsic viscosity] was very nearly constant, despite a very wide range in the properties of the original material. This ratio varied from 230 to 280, indicating that the d.p. is approximately a linear function of the intrinsic viscosity. This finding is at least qualitatively in harmony with Staudinger's hypothesis—although the ratio was quantitatively greater. It is interesting also to find that for native cellulose Kraemer and Lansing found molecular weights as high as 570,000, and that in the case of purified cellulose the molecular weights ranged from 150,000 to 500,000.

There has been considerable disagreement with the view of Staudinger that chain molecules exist as such in solution. Most of the ensuing polemics need not be referred to here, but a few isolated facts may be of interest in showing the nature of the criticism to Staudinger's hypothesis (which, despite its speculative character, has appealed to many physical chemists). Professor E. L. Hirst, of the University of Birmingham, in discussing a paper by Davidson (*18*) said that "it had been shown that under suitable conditions methyl derivatives of cellulose could be prepared corresponding to an apparent chain length of some 500 glucose units" (this would mean a d.p. of 5000; a molecular weight of over 900,000). This figure is in excess of the highest values hitherto recorded by viscosity, osmotic pressure or ultra-centrifuge methods. Dr. Hirst went on to say that the explanation of these results would have to await further research. The analytical method of Haworth and Hirst already referred to in the introduction (*19*) usually showed a chain length (d.p.) of only about 180, anhydroglucose residues. This is difficult to reconcile with Staudinger's findings. Of course, Haworth worked with methylated celluloses, and as Karrer and Escher (*20*) have pointed out, native cellulose cannot be directly methylated to the theoretical methoxyl content which is about 45.6 per cent. Only when cellulose was previously regenerated or acetylated could the methoxyl content reach this value. With drastic acetylating agents, however, marked degradation took place as shown by increase in the copper number. Only in cellulose acetate prepared by Haworth and Machemer's method (with acetic acid, chloroacetic anhydride, and sulphur dioxide) was the copper number kept low. Karrer and Escher also showed that when the drastically-acetylated celluloses were subsequently methylated, their methoxyl content increased with copper number—and sometimes actually exceeded the theoretical percentage of methoxyl for a trimethyl cellulose. Haworth's cellulose acetate gave a methyl cellulose with only 42.2 per cent methoxyl. Slightly above this methoxyl content (at 42.43 per cent methoxyl, which is more than three per cent below the theory) Karrer and Escher could no longer get any test for free hydroxyl groups. And (methyl) alcoholysis of such methyl celluloses gave not only 2, 3, 6-trimethyl-methyl glucoside, but a certain fraction of 2, 3-dimethyl-methylglucoside. If Karrer's data are accurate, this would indicate that at least some of the hydroxyl groups in position 6, of certain of the anhydroglucose units are blocked, and the value of the Birmingham analytical technique is thrown open to question.

The results of Kraemer and Lansing also militate against the molecular chain lengths obtained by Haworth's analytical method, and may serve to explain them. Haworth's methyl cellulose is ordinarily prepared (as indicated above) from cellulose acetate. For the cellulose acetates examined by them, Kraemer and Lansing, using the ultra-centrifuge, found molecular weights ranging from 45,000-100,000. These correspond to d.p.'s of 175-360 in the cellulose. *The reader will note that this lower figure is quite close to the values obtained by purely analytical means by Haworth and Hirst at Birmingham.* It is, however, far below the d.p. of 3500 found for *native* cellulose by Kraemer and Lansing. A possible explanation is that degradation has taken place during acetate formation. This explanation is made with the greatest reservation by the author since Dr. Hirst has stated very definitely that cotton cellulose could be acetylated giving acetates with very high viscosity.

Reference should be made to another analytical procedure used in computing d.p. Erich Schmidt and his coworkers (*21*) have devoloped a potentiometric titration method which, it is claimed, measures the percentage of carboxyl groups in native cotton as well as in wood cellulose. In every case to date, Schmidt has reported that native cellulose contains 0.28 per cent carboxyl (calculated as CO_2) and from this he calculates the chain length of cellulose as 96 anhydroglucose units. This would represent a length of about 500 Angstrom units, the order of magnitude of

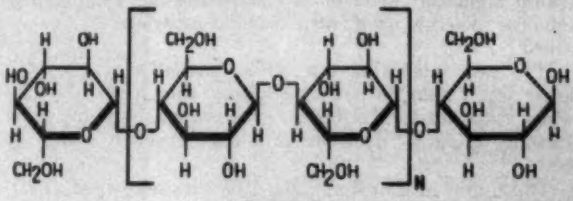


Figure 2.

which is the same as that obtained by Haworth. Schmidt's findings presuppose a carboxyl instead of an aldehydic (or hemiacetal) grouping at the extreme end of the molecule. This may of course be due not to the original material, but to the method of isolation or treatment of the cellulose—although Schmidt does not believe this is the case. Neale and Stringfellow (*22*) found Schmidt's method for determining COOH groups unsatisfactory in their work. Ludtke (*23*) as a result of much experimentation, has also concluded that the acid number of a cellulose cannot be used satisfactorily in determining its chain length, and that the carboxyl groups are due to organic acids of nigh molecular weight that are not a part of the cellulose.

If, however, Schmidt's interpretations are correct, they are entirely out of harmony with Staudinger's. This is indicated by data recently published by Staudinger and Juresch (*24*). These investigators found that the use of ClO_2 in the treatment of cellulose changes its initial d.p. very, very slowly. On the other hand, Schmidt and his school who developed this method for isloating cellulose by means of ClO_2 find regularly a d.p. of only 98—which is a lower order of magnitude than that found by Staudinger for similar material.

Furthermore, Staudinger himself has shown that dead-grinding of cellulose, which yields material unsuited to paper-

making, may leave the d.p. practically unaltered as shown by viscosity data. This merits further explanation, since the logical assumption would be that the mean chain length would be shortened on beating.

Doubt has been cast on the determination of molecular weights by the use of viscosity measurements by McBain and Scott (*25*). The inadequacy of viscosimetric results in determining whether or not cellulose exists in the form of molecules or micelles has also been pointed out by Lieser and his co-workers (*26*). These investigators concluded that in cuprammonium and xanthogenate sols, cellulose is present in the micellar form, but that dissolved in quaternary ammonium hydroxides (e.g. tetraethylammonium hydroxide) cellulose may be present in the form of macromolecules, especially when the temperature is low. At higher temperatures they think the micelles are formed again.

Stamm has referred to a number of thickness measurements on films of cellulose derivatives that have been spread on mercury (*27*). In all these investigations the thickness found was that of a single glucose molecule. Either Staudinger's single macromolecules are at hand or else the aggregates can open up in such a way that they have the thickness of a single molecule when the films are formed on mercury.

While the viscosity method for molecular weight determination is certainly still problematical, Kraemer and Lansing seem to have presented a strong case for the sedimentation equilibrium method in ultra-centrifugal analysis. Starting with cellulose as di-acetate (1), two products were formed: a cellulose triacetate (2) and a regenerated cellulose (3). The latter was then carefully acetylated to a triacetate (4) which was changed into a diacetate (5), and then into a regenerated cellulose (6). It is interesting to note that while the molecular weight of (1) was 95,000, those respectively of (3), (5), and (6) were 103,000, 90,000 and 93,000. Degradation during these conversions seems to have been very slight. For Kraemer and Lansing's critical arguments in favor of considering the solute as the cellulose molecule itself, their original paper should be consulted.

It is also interesting that while acetylation gives much lower d.p.'s than do native celluloses, this is not the case when fully nitrated cellulose is examined. Kraemer and Lansing, using a "dynamite cellulose" obtained a d.p. of 3000.

These same investigators claim that ultra-centrifugal analytical methods give results comparable in accuracy with those obtained by such classical determinations as the increase in boiling point when the latter are applied to non-electrolytes with small molecular weights.

To summarize what we have stated above regarding the molecular weight, chain length, or "d.p." of cellulose is none too simple a matter.

(1) By purely analytical methods the d.p. of native cellulose appears to be about 100-200.

(2) From viscosimetric data it appears to be about 2000-3000.

(3) From ultra-centrifugal data it seems to be about 3000 (or more).

Of these methods (3) has perhaps the best theoretical and experimental support. The difficulties can be envisaged when we recall that even native cellulose is probably molecularly non-uniform.

The author, however, believes that the ideal method for determining molecular weights of cellulose has yet to be discovered. *All recorded molecular weights must still be considered tentative.*

Also, it is uncertain whether or not Karrer's findings that the blocking of a certain number of hydroxyl groups in position 6 (in various anhydroglucose units of the molecule) has a deeper significance than might appear at first blush. Are these groups really *absent?* If so, is there an attachment between one chain molecule and an adjacent molecule accounted for by primary (rather than secondary) valence forces (e.g., with the formation possibly of oxonium compounds)? Would this account for some of the faulty sections in the cellulose crystallites? Are the chains then actually shorter than the ultra-centrifugal data would indicate (assuming that these data do give a true index of the molecular magnitude of cellulose)? Are the chains thus bound into a thin network only a few Angstrom units in thickness? And if so, does this network persist even in nitration, and in every dilute solution? Is it broken down on complete acetylation? Do Haworth's data represent the actual average lengths of individual chains detached from the network, but not the true molecular weights of the cellulose molecules themselves?

These are simply rhetorical questions at present. The author trusts that they are pertinent. Their answers await future experimental data.

Finally it appears that quite irrespective of whether or not the d.p. gives a measure of cellulose molecular chain length, this figure has a practical significance in the paper, rayon, cellophane and lacquer industries. This fact has already been pointed out by August Noll (*28*) and by Staudinger and Juresch (*29*).

Literature Cited

1)—"Tannin, Cellulose, Lignin," published by J. Springer, Berlin, (1933).
2)—Stamm, A. J., "Colloid Chemistry of Cellulosic Materials," U. S. Dept. of Agriculture, Miscellaneous Pub. No. 240.
3)—Der Aufbau der hochpolymeren organischen Naturstoffe auf Grund molekularmorphologischer Betrachtungen; 264 pp. Leipzic.
4)—Neale, S. M.; Trans. Faraday Soc. 29, 228 (1933) Freudenberg; Papier-Fabr. 35, 49 (1937), (Cf. *The Paper Industry*, May, 1937, pp. 229-31) Sponsler, *Quart. Rev. Biol.* 8, 1 (1933). I. W. Bailey, *Ind. Eng. Chem.* 30, 40 (1938).
5)—*Ber.* 70B, 266-74 (1937).
6)—*Helv. Chim. Acta* 20, 232-44 (1937).
7)—Staudinger, H.; Trans. Faraday Soc. 29, 18 (1933). H. Staudinger and B. Ritzenthaler, *Ber.* 68, 1223-33 (1935). H. Staudinger and E. Dreher, *Ber.* 69, 1091-8 (1936). H. Staudinger, *Zellstoff-Faser* 33, Nos. 11/12, 153-65 (1936).
8)—*Ber.* 70, No. 12, 2514-7 (1937).
9)—*J. Soc. Dyers and Colourists* (Jubilee Issue, 1884-1934), 16-23.
10)—*Zeitschrift Phys. Chem.* (A) 139, 235 (1928).
11)—*J. Phys. Chem.* 39, 153 (1935).
12)—J. A. C. S. 52, 3047 (1930).
13)—Farr and Eckerson, Boyce Thompson Inst. Contrib. 6, 189-203 (1934); Ibid. 6, 309-13 (1934); Farr and Sisson, Ibid. 315-21 (1934); Farr *Textile Res.* 6, No. 2, 518 (1936).
14)—Cited by Stamm, loc. cit. p. 86.
15)—*Cellulosechemie* 16, No. 12, 114 (1936).
16)—*Papier-Fabr.* 35, No. 27, 233 (Fest u Auslandsheft) 1937.
17)—*Ber.* 70, No. 11, 2296 (1937).
18)—*J. Text. Inst.* 27, No. 7, 139 (1936).
19)—Faraday Soc. Trans., 29, 14 (1933).
20)—Helv. Chim. Acta. 19, No. 6, 1192 (1936).
21)—E. Schmidt, M. Hecker, W. Jandebeur, and M. Atterer, Ber. 67, No. 12, 2037 (1934). E. Schmidt, R. Schnegg, W. Jandebeur and Mr. Hecker, Ber. 68, No. 3, 542 (1935), and 69, No. 2, 366 (1936). E. Schmidt, W. Jandebeur, M. Hecker, E. Coffari, E. J. Stoetzer, and K. Meinel, Ber. 70B, 2345 (1937).
22)—Trans. Faraday Soc. 33, No. 7, 881 (1937).
23)—Biochem Z. 285, 78-91 (1936).
24)—Papier-Fabr. 35, No. 49, 459-71 (1937).
25)—Ind. Eng. Chem. 28, No. 4, 470 (1936).
26)—T. Lieser and R. Ebert, Ann. 528, 276-95 (1937); Lieser and R. Leckzyck, Ann. 522, 56-65 (1936); Lieser, Kolloid-Z. 81, No. 2, 234-41 (1937).
27)—S. E. Sheppard and R. Keenan, Nature 121, 982 (1928); J. R. Katz and P. Samwel, Ann. 472, 271 (1929); N. K. Adam, Trans. Faraday Soc., 29, 90 (1933).
28)—Cf. Abstract in *The Paper Industry*, Jan., 1936, P. 759.
29)—Cf. Abstract in *The Paper Industry*, Feb., 1938, pp. 1317-9.

ASSOCIATIONS

SUPERINTENDENTS ENJOYED CANADIAN HOSPITALITY

THE 19th annual convention of the American Pulp and Paper Mill Superintendents' Association was held at the Royal York Hotel in Toronto, Canada, from June 22nd to June 24th and was proclaimed by all the delegates and visitors who attended "the most successful ever."

The basic theme of the convention had been established as "a meeting of neighbors on friendly soil," and all during the sessions and social activities it was obvious to all that this was no hollow phrase, but a living actuality. At every meeting, comments were made on the lesson which the whole world, in its search for peace, could learn from the 125 years of amity between the two countries, Canada and the United States, and how such friendly gatherings as the Superintendents Convention were making a very real contribution to continuance of such international friendship and the fact that the International Boundary running for 3,000 miles across the continent joined, rather than separated, the two nations.

F. L. ZELLERS, French Paper Co., Niles, Michigan
PRESIDENT OF SUPERINTENDENTS ASSOCIATION

These comments were not oratorical bursts on the part of the speakers. They were voiced by Canadians and United States citizens alike, and they said them because they meant and felt them.

Delegates began to arrive on Tuesday, June 21, by motor, train, and boat. This day was spent in registration and in making visits to nearby mills, which had been arranged by a committee headed by A. E. H. Fair of the Alliance Paper Mills, Ltd., at Merriton, Ontario.

That evening an Exhibitors' Dinner was held in the Ballroom of the Royal York at which more than 100 men gathered for a pleasant evening and short addresses by B. D. Millidge, 1937-38 president, and J. W. Hemphill, Chairman of the Exhibitors' Committee.

On Wednesday morning, June 22nd, the first general session was called to order promptly on schedule at 11 o'clock. President Millidge was in the chair, and the first order of business was the Invocation given by Rev. J. B. Paulin, pastor of Rosedale Presbyterian Church, Toronto. He prayed that the international aspect of the convention would strive to make its contribution toward international harmony and world peace, and that all individuals would make a personal effort toward dispelling unrest among the nations of the world.

A brief "In Memoriam" period was then conducted by National Secretary R. L. Eminger, during which the names of those who had passed on since last year's convention were read. These were: Wallace C. Amerine, Ernest W. Brush, C. H. McDuffee, John M. McGrath, Michael Redmond, and Harvey B. Steele. A short prayer was offered by Rev. Paulin, and the gathering stood for a moment in silent prayer as a tribute to their departed comrades.

President Millidge then gave his annual address.

After welcoming all delegates to the convention, Mr. Millidge related that there had been an increase in membership during 1937-1938 of 110 as compared to an increase of 103 in 1936-1937; that the Southern Division was reorganized in April this year; that the Year Book has had the best year in its

Left—A fitting finale to a most successful convention —the joint banquet of the evening of the last day.

Right—Exhibitors' dinner on evening previous to opening of convention.

Left—A popular event was the men's luncheon which was held on June 22.

H. H. Harrison, of the Crystal Tissue Co., 1st vice-president of the association (left) with A. B. C. Drew of the Fairpoint Corp., 2nd vice-president.

history; and that a change in management policy of the national convention has been instituted this year, George Craigie, field secretary of the Association, being convention manager.

Mr. Millidge then cited the splendid work done by Robert L. Eminger, secretary-treasurer; thanked The Paper Mill, the official organ of the Superintendents Association, the other trade papers and the Allied Industries for the part played by each in working with the Association; commented that the value of the machinery and supplies exposition cannot be overestimated; and related that new uses for paper are continually being developed and improvements in manufacture are being made, necessitating changes in equipment and supplies.

It was also brought out by Mr. Millidge that it is essential that not only capital should be willing to accept reduced dividends during such depressed conditions as we are now going through, but that labor should also make its fair and honest contribution so that the ship may weather the economic storm and all on board be saved. Mr. Millidge also brought out that taxes are increasing steadily and something will have to be done by the people of this continent to regulate government expenditures so that taxes will be imposed on a more general and more equitable basis; that it is extremely important that the superintendents foster educational programs; and that the American Pulp and Paper Mill Superintendents Association does foster education and does function for its members in providing means for obtaining and distributing the knowledge required by pulp and paper mill superintendents.

At the close of the morning session, after a short welcome had been extended to the delegates by Mr. T. H. Rand-McNally, head of the Toronto Convention and Tourist Bureau and responded to by the then first vice-president F. L. "Roy" Zellers, committee appointments were made by Mr. Millidge. These included: Nominating—W. H. Brydges, chairman, K. E. Terry, Fred Boyce, Fred J. Rooney, E. J. Timmerman; Resolutions—H. H. Harrison, chairman, John Cornell, and Auditing—Grover Keeth, chairman, A. B. C. Drew.

At the convention luncheon which followed this session, the toastmaster was L. F. Winchell, vice-president and general manager of Hinde and Dauch Paper Co. of Toronto. Mr. Winchell was chairman of the Entertainment Committee for the Convention and received much praise for the contribution he made toward seeing that the guests had a happy stay in Toronto.

He introduced Comptroller McNish, who extended the official welcome for the City of Toronto. Mayor Ralph C. Day was unable to attend owing to an important conference with the Ontario Government and asked Mr. McNish to appear for him.

The speaker for the luncheon was Capt. the Rev. Norman Rawson of Hamilton, Ontario, who is well-known as a lecturer in Canada and the United States. He called his address "Leadership For A Day," and spoke of the casual attitude which many people took today towards democratic freedom. He stressed the fact that such freedom must be fought for, just as consistently for, as any war for freedom, and that if the democratic nations of the world did not face the fact that democracy was on the defensive, they might find themselves in the position of many European countries which had had the yoke of dictatorship placed on their shoulders.

While this luncheon was going on, the ladies who attended the convention were being entertained at a luncheon and musicale in the Round Room of Eaton's-College Street store.

At 2:00 o'clock, a general conference was assembled and three papers were heard.

These papers were: "Efficiency in Paper Making"—B. L. Kassing, Supt. Hammermill Paper Co., Erie, Pa.; "Continuous Grade Costing in a Paper Mill"—Donald Ross-Ross, Chief Industrial Engineer, Howard Smith Paper Mills, Ltd. and subsidiary companies; and "The Development of Modern Wage Incentives" — Alexander Strong, Rath & Strong, Inc., Boston, Mass.

Interesting discussion followed the reading of each paper, and it was not until nearly 6:00 o'clock that the meeting was adjourned so that the delegates could get into their blue blazers and

Left—Robert L. Eminger, secretary-treasurer of association. Center—Oscar Stamets of the Riegel Paper Corp., 3rd vice-president. Right—James J. Rogers II, of the James J. Rogers Co.

SOME OF THE ALLIED INDUSTRIES' EXHIBITS

1—Taylor Instrument Companies
2—Joseph T. Ryerson & Son, Inc.
3—Link-Belt Company
4—Bagley & Sewall Co.
5—The Bauer Brothers Co.
6—Samuel M. Langston Co.
7—Sandy Hill Iron & Brass Co.
8—Crane Co.
9—International Nickel Co., Inc.
10—The Black-Clawson Co. and Shartle Bros. Machine Co.
11—The Nash Engineering Co.

ENGINEERING

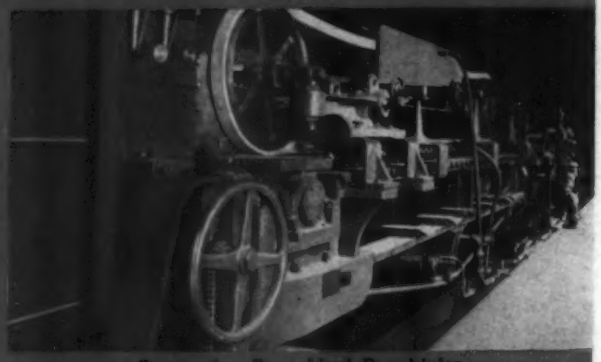
Applied to

PAPER MAKING MACHINERY

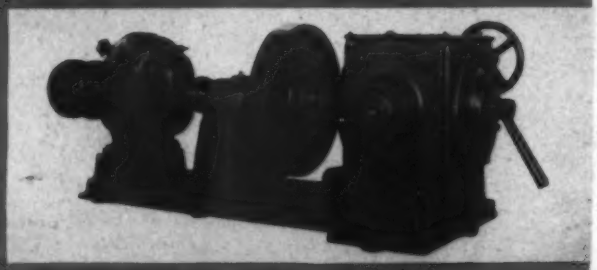
Seventy-eight years in the development of better pulp and paper mill machinery finds Sandy Hill with an enviable growing list of available outstanding engineering achievements —from Continuous Pocket Pulp Grinders right on through the gamut of mill equipment, including the latest types of complete Pulp and Paper Machines. ★ From the beginning, Sandy Hill has maintained a steadfast policy of safe progress. No pulp or paper mill problem has been too difficult for Sandy Hill engineers. ★ Following this policy, Sandy Hill machinery continues to forge ahead in the field of paper mill engineering —not by flashy advertising or gadgets, but on the strength of its reliability and performance.

THE SANDY HILL IRON & BRASS WORKS

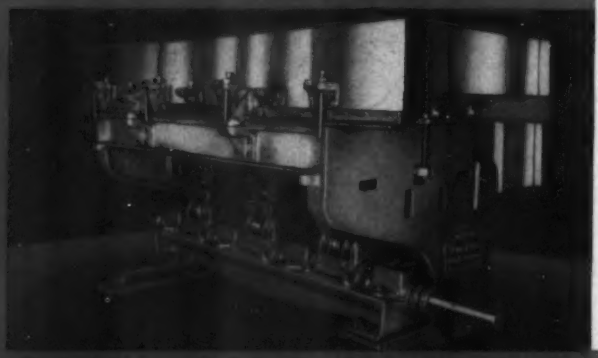
HUDSON FALLS, NEW YORK



Suspension Type Ideal Fourdrinier.



Sandy Hill Screening Blades.



"Tucker" Screen with Roller Shoe Drive and Non-Corrosive Vats, Frames, and Flow Boxes, available in 4- to 16-Plate sizes.

Sandy Hill Pulp and Pape Machine

LEADERSHIP

A pioneer since th cently
1880's in the engineering development of the most ef- recogni
cient, economical, and flexible flat paper and pulp screen. "S
"SANDY HILL" stands foremost in the eyes of the pape of cylin
and pulp world, constructing now its 6,600th "Packe" adjustal
screen, including the new roller shoe drive and non- formatio
corrosive metal vat, frame, and flow box. Hy

The suspension type Fourdrinier, first conceived by Bertram
"SANDY HILL" and developed as the "Ideal" Fourdrinie Bleach
for both straight Fourdrinier and Harper machines, re- Suction

Sandy Hill Heavy Duty Hypoid Corner Drive.

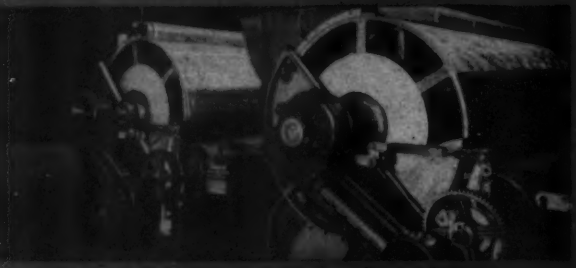
Machinery Is Built Here.

cently blossomed forth stream-lined with all the latest recognized sound engineering improvements.

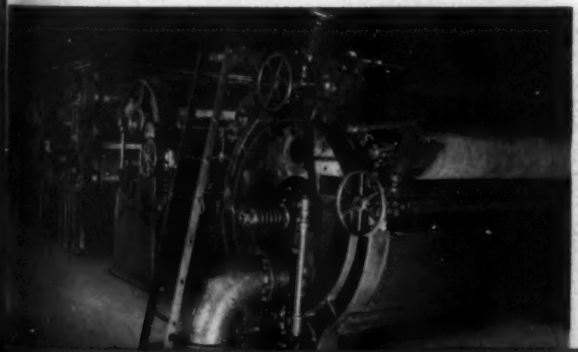
"SANDY HILL" chalks up one more score on its list of cylinder machine developments with a new type of adjustable cylinder vat allowing adequate and flexible formation control during operation.

Hypoid and Spiral Bevel Corner Drives, Sandy Hill Bertrams Shake, high capacity Kamyr Wet Machines, Bleach Plant, Pressure Thickeners, Washers, and Rotary Suction Boxes, all represent other major achievements.

Rotary Suction Boxes, Kamyr Patent.

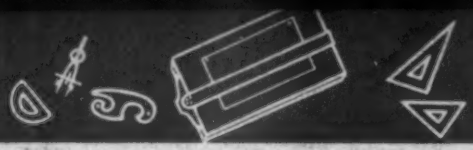


Pressure Thickener and Washer, Kamyr Patents.



High Capacity Kamyr Fourdrinier Wet Machine with Presses, producing pulp 50%-55% air dry.

Continuous Pocket Pulp Grinder, 4-foot wood, Kamyr Patent.

1860 —  — 1938

PULP AND PAPER MACHINES — Sandy Hill has recently built 3 brand new Fourdriniers and 4 new high capacity pulp machines.

ROLLER SHOES — Over 100 new "Packer" screens and many existing screens equipped with the latest roller shoe drive.

OPEN SIDE "PACKER" SCREEN — 6,600 built, and the screen is now available with non-corrosive vats, frames, and flow boxes.

GRINDERS, INTERNATIONAL AND KAMYR CONTINUOUS POCKET TYPE — Over 100 Sandy Hill Pulp Grinders now in operation in the United States.

ROTARY SUCTION BOXES, KAMYR PATENT — Used on slow running Fourdriniers for heavy board stock (2 of these boxes built by us this year replaced 13 ordinary suction boxes).

ENGINES — ALLEN MIXING — Available in all-metal construction for capacities up to 75 tons per day.

SLITTING AND WINDING MACHINES — Four Sandy Hill Double Drum Winders with slitters, two Sandy Hill Heavy Duty Reels, and one English type reel built recently.

SHAKES — SANDY HILL, BERTRAMS PATENT — Giving an infinitely variable increment of length and number of strokes from zero to maximum while Fourdrinier is running. The last word in shakes.

NEW SANDY HILL CONNECTIONS

New arrangements with Bertrams Limited of Scotland and Paper Machinery Limited of Montreal, representing Kamyr of Sweden, Norway, and Finland, make available to American pulp and paper manufacturers the finest and most recent paper mill developments on the European continent through The Sandy Hill Iron & Brass Works as paper machinery manufacturers.

THE SANDY HILL IRON & BRASS WORKS,
Hudson Falls, New York.

Gentlemen:

I am interested in the following items which I have checked. Please send me complete information about them.

- ☐ New Design "Ideal" Fourdrinier Paper Machine.
- ☐ Yankee Fourdrinier Paper Machines.
- ☐ Harper Fourdrinier Paper Machines.
- ☐ Adjustable Cylinder Vat and Cylinder Paper Machines.
- ☐ Sandy Hill Shake, Bertrams Patent.
- ☐ Slitting and Winding Machines.
- ☐ Heavy Duty Centrifugal Pumps.
- ☐ Quick Opening Gate Valves.
- ☐ "Packer" Screens with Roller Shoe Drive and Non-Corrosive Vats, Frames, and Flow Boxes.
- ☐ Hypoid and Spiral Bevel Gear Drives.
- ☐ High Capacity Kamyr Feltless Wet Machines.
- ☐ Continuous Pocket Pulp Grinders, Kamyr Patent.
- ☐ Pressure or Vacuum type Thickener and Washer, Kamyr Patent.
- ☐ Rotary Suction Boxes, Kamyr Patent.
- ☐ Gray Iron, Semi-Steel, Brass, and Aluminum Castings.
- ☐ Rubber, Iron, Steel, Brass, Wood, and Aluminum Rolls.

Name .....

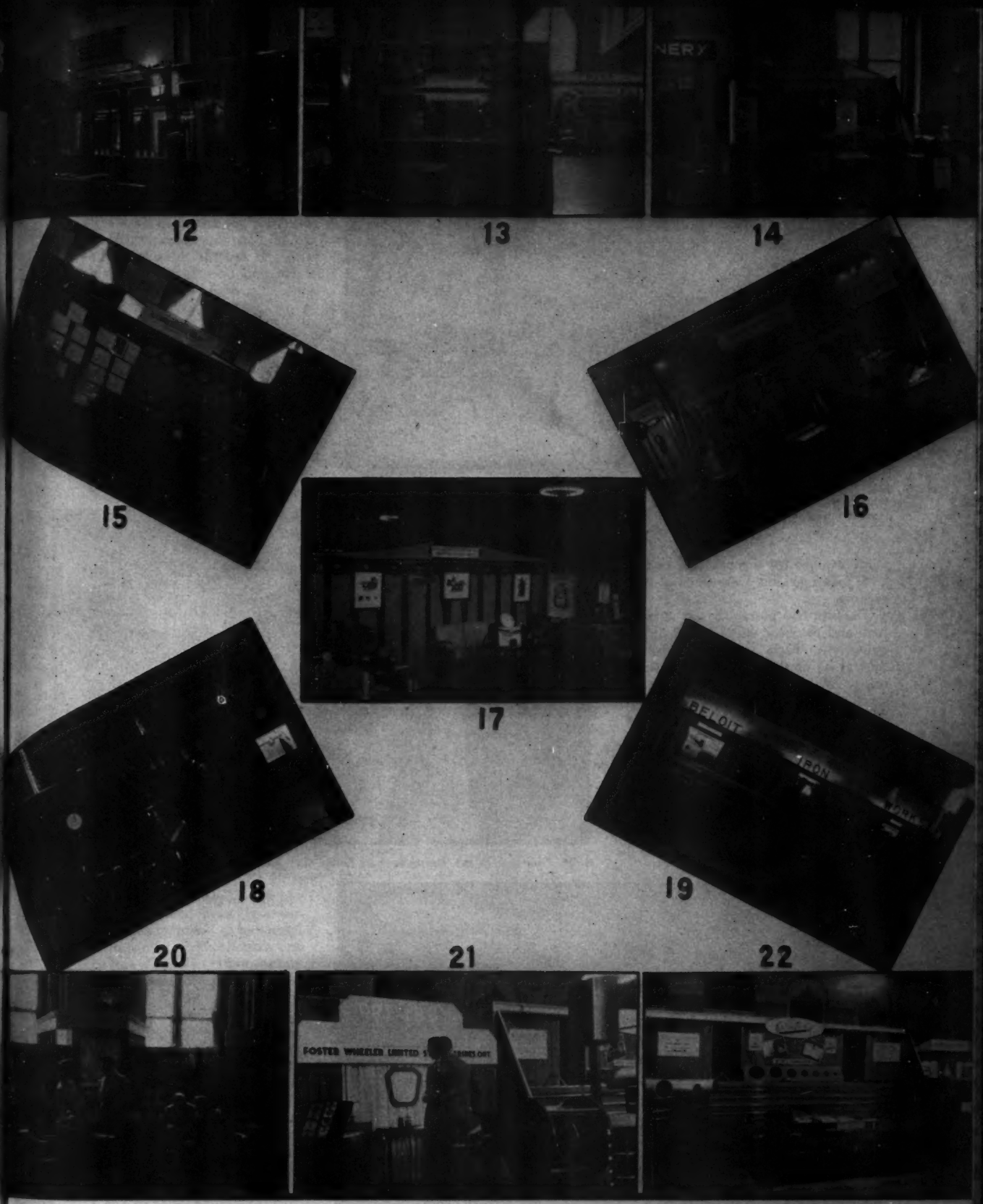
Title .....

Company .....

City and State .....

THE SANDY HILL IRON & BRASS WORK

HUDSON FALLS NEW Y



SOME OF THE ALLIED INDUSTRIES' EXHIBITS

12—Paper Makers Chemical Div. of Hercules Powder Co.
13—The Duriron Company, Inc.
14—Chromium Corp. of America
15—Rollway Bearing Co., Inc.
16—Cameron Machine Co.
17—Allis-Chalmers Mfg. Co.
18—Mason-Neilan Regulator Co.
19—Beloit Iron Works
20—Paper Makers Importing Co., Inc.
21—Trimbey Machine Works
22—Whitlock Sales, Inc.

Left—C. E. Macklem of the Beloit Iron Works. Right—Grover Keeth, chief engineer of the Marathon Paper Mills and 4th vice-president of the association.

white flannels for the boat sail on the S. S. "Cayuga" on Lake Ontario that evening.

The boat trip got under way at 9:30 p.m. and the boat was "loaded to the gunwales." Each "sailor" was given a cane as he or she embarked and these smart "malaccas" were the cause of much fun during the three hour sail. The day had been sweltering hot in the city and promised to continue during the evening, and those who went on the trip discovered they had found the coolest spot that could be found. For while the "city folk" continued to swelter, the "boaters" were cooled by gentle breezes from across the lake, presumably from the U. S. side of the line.

Radio sets had been placed at strategic points all over the ship, and there was a general scramble to get a good seat near a loudspeaker so as to be able to hear everything there was to hear. The fight, of course, was over before everyone got settled in their seats, and as Mr. Joe Louis was carried off in triumph and Mr. Max Schmeling was carried out on a stretcher, the fight-fans took their disappointment with a smile and swelled the crowd on the open-air dance floor on the after-deck. Here Stanley St. John and his band kept everyone in a gay, light-hearted mood until the ship docked safely again at 12:30 in the morning.

On Thursday morning, June 23, the delegates rose early and settled down to their respective group meetings, all of which had a good turn out. Seven

H. M. Hubbard of the Harris-Seybold-Potter Co., Inc. (left) with B. D. Millidge, retiring association president.

S. A. Stoege of the Black-Clawson Co.

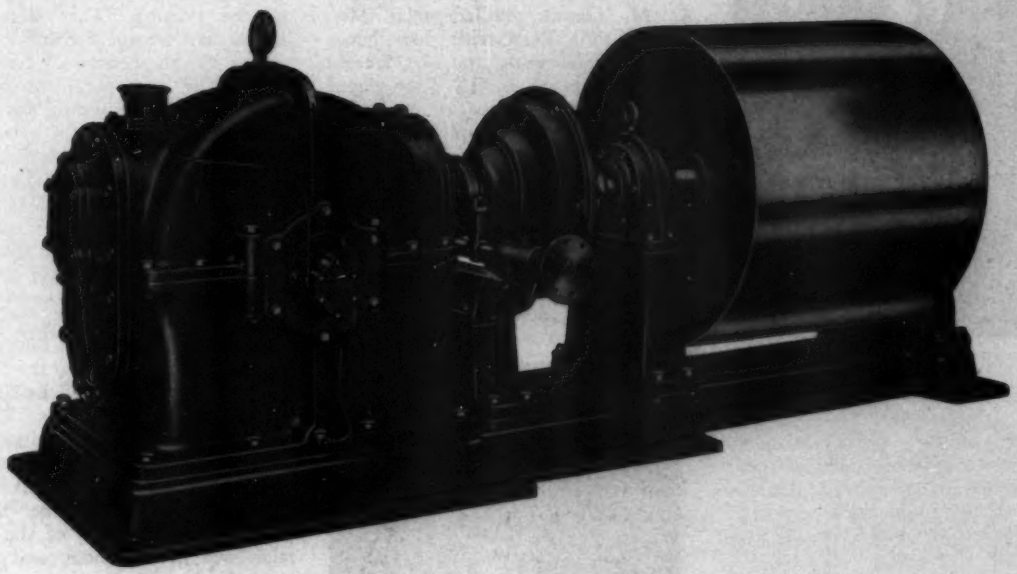
meetings were held, covering groups interested in board, chemical pulp, fine and coated papers, finishing, storing and shipping, newsprint and wrapping, plant and power engineering, and tissue.

Many interesting discussions were held after the reading of each paper, and the delegates adjourned about noon to prepare for the golf tourney in the afternoon.

While the men had been hard at work in the morning, the ladies were enjoying a golf match of nine holes at St. Andrew's Golf Club at the northern limits of the city. Quite suitably, first prize for low gross went to Mrs. B. D. Millidge, wife of the president of the association. Mrs. L. A. Lynd was second with a card of 50. Tied for a low net of 37 were Mrs. C. L. Bachelder and Mrs. B. G. Cross.

Thursday afternoon was play day for everyone. As Mr. Millidge pointed

Increase Production - -



with modern Bagley and Sewall

Hypoid or Spiral Bevel Gear Drives

MODERN types of enclosed, all-metal driving units have become so universally accepted by the progressive mills that serious consideration should be given to replacement of old type drives.

The design and construction of these modern units provide for extremely low maintenance cost, and make possible a steadier running paper machine. Accurately cut Hypoid or Spiral Bevel gears, mounted on shafts supported by anti-friction bearings, deliver a steady, positive power with a minimum of power loss due to friction and improperly operating gears.

It is a recognized fact that on older installations, where the line shaft and drives are carried on plain bearings and where the driving units employ the use of the mortise bevel gear, the power loss between the prime mover and the machine is not only very considerable, but a surprising percentage of the power delivered to the line shaft. Such conditions represent a constant waste of power, and a general unnecessary wear and tear on the equipment involved to the extent that maintenance cost is uniformly high.

Reports from numerous installations have indicated that in addition to reduced operating costs, it has been possible in many cases to actually increase production due to a smoother running condition on the paper machine.

THE BAGLEY & SEWALL COMPANY - Watertown, N. Y.

Representatives: R. T. PETRIE, 3206 N. E. 42nd Ave., Portland, Ore. - E. W. COLE, 1028 Clinton St., Kalamazoo, Mich.
H. M. SUTTON, 10 Forrest Ave., Haverhill, Mass.

S. M. BRATTON
Pusey & Jones Corp.

out early in the convention, Geo. Craigie, convention organizer and field secretary, had determined that this was to be a 50-50 session—half work and half play, and the idea seems to have worked out very well.

Each day's activities were laid out on this basis, and every one was certainly satisfied with the scheme.

The afternoon's activities covered skeet shooting, lawn bowling, an aquatic exhibition, and the men's golf tournament.

Again Mrs. Millidge took a first prize, this time at the Skeet Club, where she headed a group of six ladies. Mrs. R. W. Hynes and Mrs. E. C. Jacoby were second and third.

Mr. Jacoby won the men's skeet contest, followed by S. S. McCurdie and B. V. Ball.

The aquatic demonstration was presided over by T. C. Lloyd of Hinde and Dauch, Toronto, and he was justly credited with doing an excellent job.

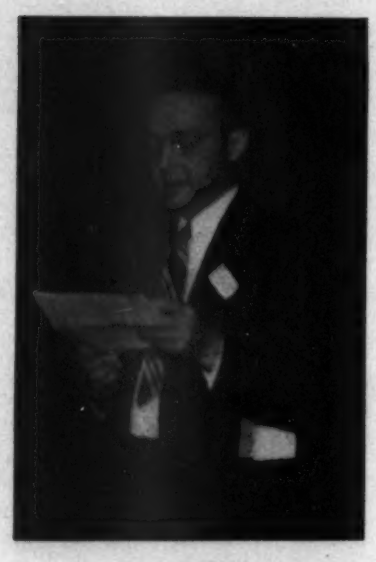
The show was held at the Sunnyside outdoor pool, Canada's largest, and a large crowd was on hand to see the ornamental swimming, fancy diving, and comedy capers. Outstanding swimmers from the Dolphinets and Mermaids Swimming Clubs were on hand. Many of these pretty young girls hold some of the highest Canadian and International swimming and diving championships. They were under the direction of Mr. Aubrey E. Ireland, Honorary Secretary-Treasurer of the Canadian Amateur Swimming Association, Ontario Section.

One of the most interesting events of the swim meet was a performance put on by a 9-year-old lad who last year was a victim of the dread infantile paralysis epidemic which swept the United States and Canada. Much of the credit for his recovery was given to his healthful application to swimming practice.

Bowling turned out to be a "ladies' game," for the women certainly took the men for "a ride."

The women's team consisted of Mrs. C. M. Connor, Philadelphia; Mrs. Allan Griffin, Riegelsville; Mrs. James Raines, Philadelphia, and Mrs. Harold Burrows, Clifton, N. J. They played against a man's team composed of J. W. Hemphill of Johns-Mansville, New York; G. A. Peterson, Worcester, Mass., and Arthur L. Hobday of Springfield and Herbert Hobday of Lee, Mass.

Results of the men's golf match, held at St. Andrew's, where the women had done their golfing in the morning, were as follows:



O. C. CORDES
Downingtown Mfg. Co.

First low gross, 18 holes, "Bun" Beasley — Muirhead Memorial Trophy; second low gross, 18 holes, L. D. Frisbie; and third low gross, Brydone D. Millidge.

First low net, 18 holes, Tom Barrie; second low net, 18 holes, F. McDonnell; and third low net, 18 holes, B. M. Steele.

First low gross, 1st nine holes, S. N. Button; first low net, 1st nine holes, K. Terry; first low gross, 2nd nine holes, H. F. Bigelow; and first low net, 2nd nine holes, C. E. Youngchild.

On Thursday evening, the ladies held their annual banquet on the Roof Garden of the Royal York, where a special entertainment program was put on, accompanied by the lilting strains of Stanley St. John and his band.

This left the men free to attend the supper, smoker and special entertainment which had been prepared for them.

Outstanding features of this get-together were the fact that there was no head table and there were no speeches. Three Canadians acted as chairmen for the affair, and they were given enthusiastic credit for the success of the evening. They were C. V. Caesar and George Brown of Toronto and J. N. Stephenson of Gardenvale, Que. The latter presented the sports awards and prizes during the evening. At the conclusion of the evening, the "smoker" adjourned and the men rejoined their wives who had wound up their session at the Roof Garden.

Friday morning the delegates got down to business again, while their wives took a jaunt to Casa Loma, Toronto's famed castle perched high on a hill which overlooks the whole city. This was followed by a luncheon and afternoon bridge game at the Old Mill, on the west outskirts of the city, set in a beautiful sylvan setting. The men, however, made it their business to visit the Exhibit Hall and check up on all the new developments in the industry since they had met last year.

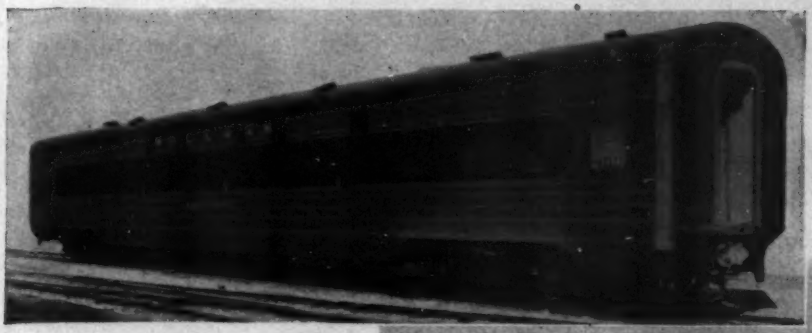
The final luncheon of the convention was held at noon and presided over by George Carruthers, president of Interlake Tissue Mills at Merritton, Ontario.

The speaker of the affair was R. A. McInnis, president of the Canadian Pulp and Paper Association, and his comments on international responsibilities in the industry and on the handling of the capital-management-labor triangle were very much to the point and extremely well received.

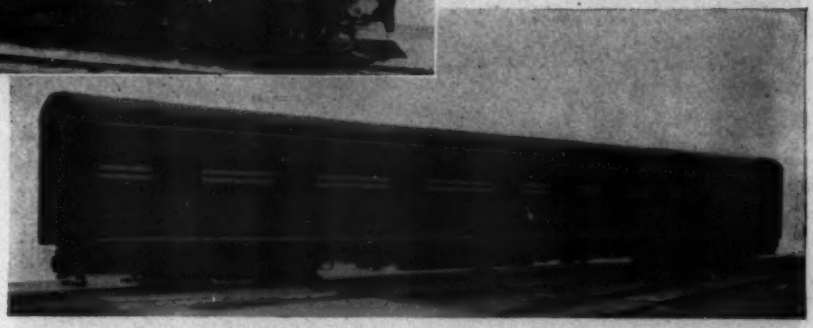
Don't let us make the mistake, said Mr. McInnis, of ignoring the import-

G. A. PETERSON
Rice, Barton & Fales Co.

74 NEW STREAMLINED PULLMAN CARS GO ON TIMKEN BEARINGS



One of the 52 new Pullman cars for the Pennsylvania Railroad. All journals equipped with TIMKEN Bearings.



One of the 22 new Pullman cars for the New York Central System. All journals equipped with TIMKEN Bearings.

Tapered Roller
TIMKEN BEARING
EQUIPPED

A symbol of quality for any piece of equipment with which it is associated

74 of the 104 new streamlined Pullman sleeping cars built by the Pullman Standard Car Manufacturing Company for service on the Pennsylvania and the New York Central Railroads are equipped with TIMKEN Tapered Roller Bearings. A number of these new Timken Bearing Equipped cars will be used by the Pennsylvania Railroad in its renowned "Blue Ribbon Fleet" including the "Broadway Limited", "The General", "Liberty Limited" and "Spirit of St. Louis". The remainder will be used by the New York Central mostly in the service of the famous "Twentieth Century Limited".

TIMKEN Bearing application as used on the axles of these new Pullmans.

With TIMKEN Roller Bearings on all axles gentle, jarless starting and smooth, joltless running are assured. Furthermore, high train speeds can be maintained over long non-stop runs without a thought of a hot box because, with TIMKEN Bearings in the journals, friction is out. The success leading American Railroads have enjoyed with TIMKEN Bearings has its parallel throughout all industry. You want this same dependability and endurance in the equipment you buy.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

Manufacturers of TIMKEN Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; TIMKEN Alloy Steels and Carbon and Alloy Seamless Tubing; TIMKEN Rock Bits; and TIMKEN Fuel Injection Equipment.

TIMKEN
TAPERED ROLLER BEARINGS

GOLFERS

1—ALLAN HYER
Black-Clawson Co.

2—E. PETERSON
B. F. Goodrich Co.

3—B. F. ENGLEHART
Oswego Falls Corp.

4—C. P. LUDINGTON
E. B. Eddy Co.

5—F. B. EILERS
Eilers Mill Supply Co.

6—F. K. BECKER
Bird Machine Co.

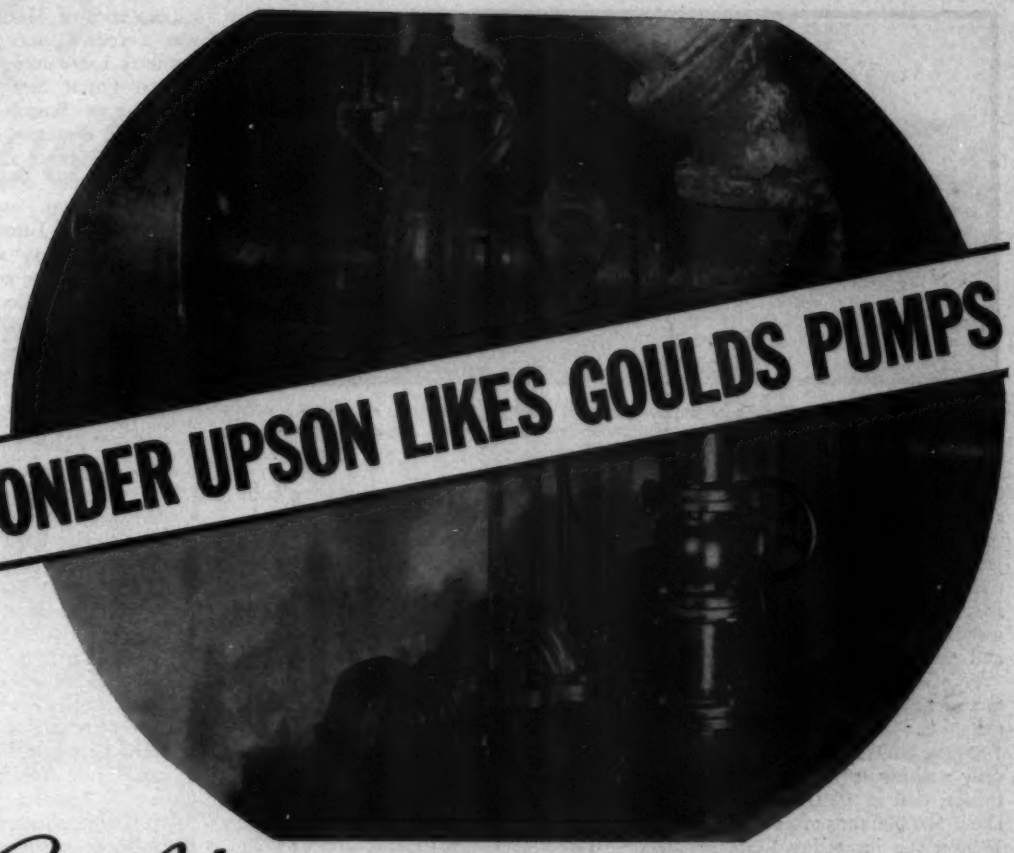
ance of this industry by failing to realize its future and potential greatness. Twenty-five years ago, he continued, about 5,000,000 tons of paper products were consumed in the United States, as contrasted with 16,000,000 tons in 1937.

In these recent years, he added, three great paper products have developed, expanded, and become major sections of your industries—board, wrapping papers, and book papers—the three combined meant an American consumption in 1937 of about 9,200,000 tons.

Mr. McInnis then related that the principal production in Canada is newsprint, and that in 1913 Canada produced 350,000 tons of newsprint. He also stated that Canada produced and shipped 3,600,000 tons of newsprint—mainly to a growing and hungry American market, and that the world's consumption, including United States and Canada, of paper products in 1937 was 32,000,000 tons.

You men, continued Mr. McInnis, who are in charge of our operations today in the pulp and paper mills of the United States and Canada, whether you have technical training, or whether you are the so-called practical men, have each of you a great and immediate pressing problem that no one but you working alone or together can solve. I refer, said Mr.McInnis, to the manner in which you deal with our labor relations.

Mr. McInnis further stated that our whole industrial system which involves capital, management, and labor relations, is very close to a complete and chaotic collapse, unless we can find in ourselves some sound remedy; that labor has long demanded and long fought for the rights of labor; that today only a few rights exist anywhere; that capital and industry have very few left, and almost every right that labor fought for it has lost to the rising tide of isms; that we in our respective mills must find ways and means to unite with those workers of ours, and make it part of our every day job to understand their problems,



NO WONDER UPSON LIKES GOULDS PUMPS

Goulds The top photograph shows a Goulds Fig. 3105 Single-Stage, Single-Suction, open impeller centrifugal pump installation at the Upson Co., Lockport, N. Y. plant. The pump handles paper stock of 3% slush —mixed papers—corrugated, etc. from breaker beaters to beaters.

The pump has satisfactorily handled approximately 100 tons of stock every 24 hours for the past 3 years, maintaining a steady flow of production.

Pictured below is a second installation featuring a Goulds Fig. 3075 Single-Stage, Double-Suction Pump used to pump white water from machine pit through economizer to beaters. This pump has been performing for over 3 years, with unvarying satisfaction—typical of Goulds Pumps performance everywhere.

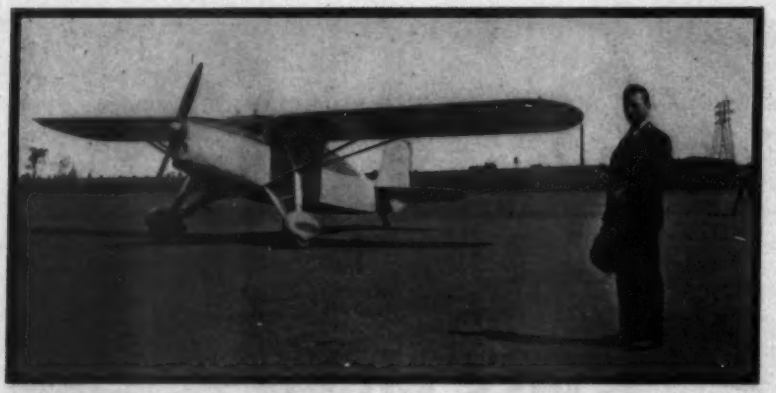
For over half a century Goulds has been building pumps for the paper industry, embodying our experience into efficient design and durable construction to assure low-cost, dependable service under severe operating conditions.

For complete information write for Bulletin No. 206, Pumps For The Paper Industry.

GOULDS PUMPS Inc.

ATLANTA, BOSTON, CHICAGO, HOUSTON, NEW YORK, PHILADELPHIA, PITTSBURGH, TULSA. Representatives in all Principal Cities

8404



A flying enthusiast is S. Nelson Mann, president of Whirlflex Sales Inc., shown here with his speedy monoplane. Mr. Mann is distributor for the Fairchild Airplane Corporation at Buffalo, N. Y.

their ideals, and their objective desires, and, in turn, to take them along with us in our problems and in our objectives in order that we may become a united front of responsible men in industry and in labor, working together with understanding, tolerance, and patience.

Another important thing we need to co-operate on, he added, is our raw materials. He emphasized that in 1900 the United States imported practically nothing in the way of raw materials; that in 1910 it was importing about 500,000 tons of pulp, and that in 1920 it was importing 1,000,000 tons of pulp, in 1930 1,800,000 tons of pulp, and in 1937 almost 2,500,000 tons of this product — this tonnage coming largely from Sweden, Finland, and Norway, and only about 700,000 tons from Canada.

Mr. McInnis further reiterated that we, here in Canada, have been exporting our pulpwood to the United States to the extent of 1,000,000 to 1,500,000 cords annually; that, here in Canada, we have been deluged in the past three years with Europeans who are looking to make arrangements for the importation from this country of our pulpwood, and our pulp products; that a total world consumption of 32,000,000 tons of paper products is very largely products other than newsprint—newsprint representing about 28 per cent of the total. He also stated that at the present time we in Canada are the largest customer the United States has, and in turn the United States is our largest customer; that the expansion of trade between these two countries is not only of economic importance but, having in mind the constant changing political situation in Europe, also of great political importance; and that we in Canada are very much impressed with the importance and necessity of protecting and preserving our forests in perpetuity.

In concluding his remarks, Mr. McInnis added, "It is my sincere hope that we, as responsible executives in the United States and Canada, will find a way to co-operate with each other so we can supply you with those raw materials you require, and so you can produce and sell for that growing market of yours those products you are so well equipped to make."

The final business session on Friday afternoon, June 24, started off with reports of committees, the election of officers, and the passing of resolutions.

Mr. F. L. Zellers was duly installed to succeed Mr. Millidge as president. The other vice-presidents advanced one rank, and L. S. McCurdy, National Paper Products, Port Townsend, Washington, was elected fifth vice-president.

The following papers were given: "The Control of Printing Quality in the Paper and Board Mill," by Dr. Gerard L. Larocque, of the Pulp and Paper Division of the Forest Products Laboratories of Montreal, Que. This was a contribution from the Forest Products Laboratories of Canada, Dominion Forest Service, Lands, Parks and Forests Branch, Department of Mines and Resources.

Then followed an address on "A Printer's Paper Problems," by Mr. Oliver Watson, superintendent of Brigden's Ltd., Toronto.

The concluding speaker was Mr. Harry Williamson, of the Williamson Research Corporation of New York, who spoke on "Formation."

Interesting and lively discussion periods followed the reading of each paper.

Of the more than 800 who registered for the convention, it is unlikely that a single individual was absent from the joint formal banquet with which the gathering closed on Friday evening. The huge Concert Hall of the Royal York was filled to capacity and extra tables had to be hurriedly set up for the overflow. Attendance was around 1,000.

Toastmaster for the evening was Mr. Harold Crabtree, president of Howard Smith Paper Mills. He introduced the speaker of the evening, Hon. Howard Ferguson, former premier of Ontario and High Commissioner for Canada in London, England.

Mr. Ferguson spoke interestingly on the current world situation and stressed the vital need for cooperation among the remaining "free democracies" of the world. A short address was also given by the new association president, Mr. F. L. Zellers.

At the close of the banquet, the huge assembly adjourned for dancing, and by 2 o'clock Saturday morning, the 19th annual convention was over.

The many ladies attending the convention added greatly to its pleasant sociability. This mixed group is about to board the S. S. Cayauga for a boat trip on Lake Ontario. Left to right: George Engert, Mrs. D. S. Stacy, Harry B. Jones, Mrs. George Engert, Harry Williamson, Mrs. Harry Jones and Mrs. Harry Williamson.

Everybody's fussy

ABOUT FOOD!

. . . and everybody's fussy about the way his food is packed. More food comes in packages nowadays than ever before, and the public insists that these packages be sanitary.

No color conveys the impression of cleanliness quite so forcefully as *white*. That's why food merchants want *whiter* wrapping papers. Whether it's butter cartons or pickle boxes, the contents are not appetizing if the package is discolored.

Do you know the modern way to obtain whiter, cleaner-looking paper? It will pay you to find out about the excellent results obtained by using Krebs white pigments in paper manufacture. Rely on these superior white pigments to make your stock whiter, brighter, and more opaque.

KREBS

PIGMENTS FOR PAPER

KREBS PIGMENT & COLOR CORP. . . . 1007 Orange Street, Wilmington, Delaware

The Lievre River tumbles down into the Ottawa right beside the pulp and newsprint mill of the Maclaren Company.

CANADIAN TECHNICAL MEN HAVE PROFITABLE MEETING

A SUMMER Meeting should not involve any hard work. It should be more of the nature of a pleasant vacation selected so as to be of the greatest benefit to the largest number. This very evidently was in the minds of the organizers of this year's Summer Meeting of the Technical Section of the Canadian Pulp & Paper Association, which took the form of a series of visits to a variety of pulp and paper mills and of plants of industries related to the pulp and paper industry. This, combined with weather made to order and with a stay at one of the most wonderful resorts to be found anywhere, made the meeting a perfect one in every respect.

The rallying point was the Hotel Cornwallis, at Cornwall, Ontario, where members and their guests arrived from far off points in Eastern Canada and the United States on Thursday morning, June 9th. In the morning and afternoon they divided into numerous small groups to visit three points of great interest.

The members were given an opportunity to visit the huge, wonderfully organized and spotlessly clean viscose rayon plant of Courtaulds, Ltd., where an exceptionally high grade of sulphite is converted into viscose yarn. They were indeed fortunate to have had the seldom accorded privilege of going through this very remarkable factory.

The Howard Smith Paper Mills plant offered several features of interest, including the circulating system of the sulphite digesters, the Rosenblatt system for the recovery of heat and sulphur dioxide from the sulphite blowpits, which has just been installed but has not yet been started up, the electrolytic chlorine plant, the soda pulp mill, and the Flakt system for the air-drying of pulp which has, among others, the advantage of turning out a product several points whiter than is obtained with the ordinary steam-heated dryer rolls.

At the Mille Roches mill of Provincial Paper Mills interest centered chiefly around the de-inking and defibering system and the latest type of Bird screen recently installed.

After luncheon at the Cornwallis Hotel the only business of the entire meeting was transacted when amendments to the by-laws defining the several classes of membership in the Section, student, junior, associate, senior and honorary, were adopted unanimously. As explained by Dr. Hoover, Chairman of the Section, the changes were rendered advisable by the fact that it is proposed to limit competition for the Weldon medal to senior and associate members, and for the Howard Smith medal to junior members.

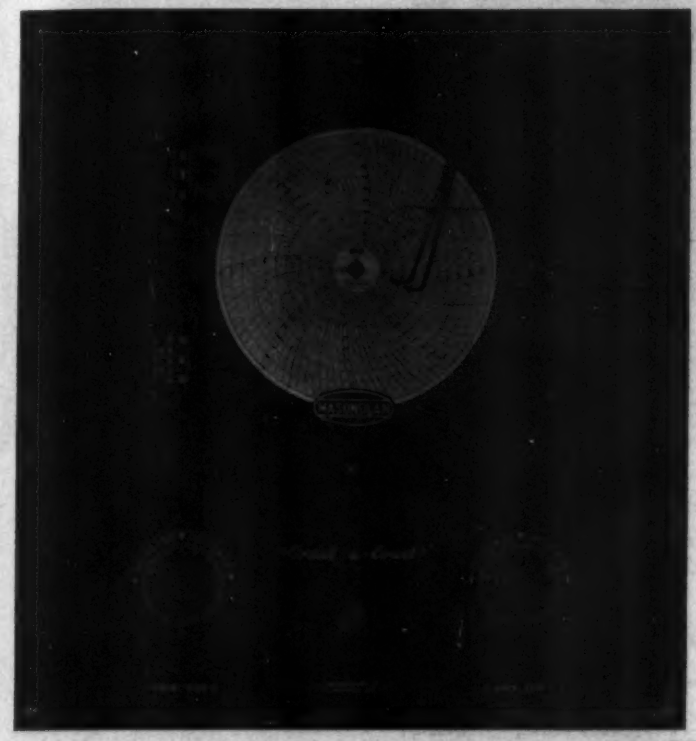
After completing the mill visits, the delegates motored to the Seigniory Club at Lucerne-en-Québec, one of the most famed summer and winter resorts in America. Ideally situated on the north shore of the Ottawa River,

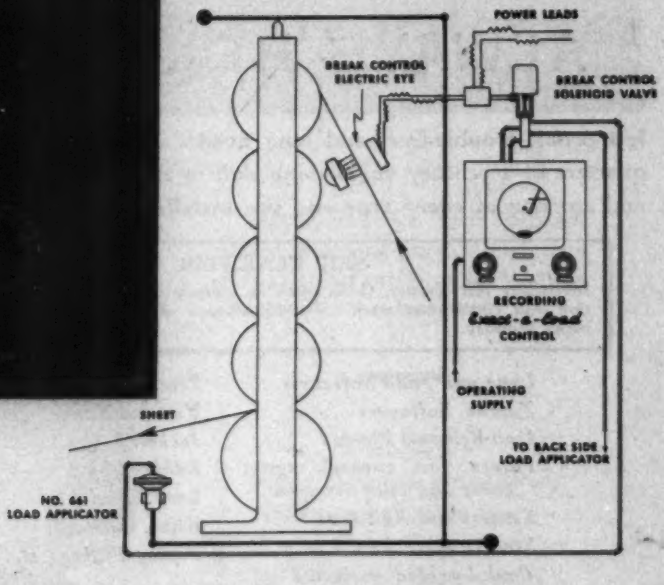
Left—W. Ketchen of Fraser Companies, admires the beautiful Ottawa River. Center—Dr. Maas, Director of the Department of Chemistry at McGill University and honorary life member of the section, thoroughly enjoys the relaxation. Right—No technical section meeting would be complete without George Carruthers. Here he is with his usual genial smile.

Left—Some of the delegates assembling to go through the Howard Smith mill at Cornwall, Ontario. Center—The old Papineau Manor. Right—The log chateau is situated on the bank of a sheltered basin on the Ottawa River.

AUTOMATIC LOADING CONTROL

WITH EXCLUSIVE ADVANTAGES





Exact-A-Load Control provides *precise* automatic control of loading pressure on each end of press, squeeze, calender or super calender rolls. Once set by means of the knobs on sensitive adjusting valves, the loading pressure remains constant despite fluctuating air supply, lumps in the sheet or rolls out of round. Both ends are unloaded simultaneously by pushing in the knob of the 6-way unloading valve—both ends are reloaded to the set pressure by pulling out the knob. In case of a sheet break on super calender stacks the rolls are instantly, automatically unloaded.

This modern control unit will save you money by improving quality, increasing capacity and by reducing roll wear and operating expense. Write for complete information.

Exclusive features of this design include:

Large diaphragm load-adjusting valves for very sensitive, accurate control.

Compact, rugged, six-way unloading valve with push-pull action.

On manual or automatic unloading, air supply to diaphragms (or cylinders) is shut-off —and only diaphragm pressure exhausts to atmosphere. There is no venting of operating air supply.

There is no continuous bleed of air; air is used only when diaphragm pressure changes.

Solenoid valve for automatic unloading may be energized by switch or by electric eye, as shown.

Either recording type (illustrated) or indicating type available.

1196 ADAMS STREET, BOSTON, MASS., U. S. A. MASONEILAN

New York Philadelphia Pittsburgh Buffalo Chicago St. Louis Tulsa Houston Los Angeles

GRAVER TANKS

ALWAYS RELIABLE

Graver Water Treating Equipment, Tanks and Steel Structures are leak-proof, trouble-free, and long lived . . . the result of three-quarters of a century engineering skill in the design, construction, and erection of every type and size installation.

SEIP CLARIFIER

Investigate this clarifier, (built upon an entirely new principle) for filtration and clarification work. Far in advance of anything else for the paper industry.

Lime and Soda Softeners
Zeolite Softeners
Iron Removal Plants
Filters for mineral, taste, color and odor removal
Settlers and Agitators
Sterilizers
Tanks, welded or riveted
Pressure Tanks
Vacuum Tanks
Jacketed
Rubber Lined
Lead Lined
Kilns, Caissons,
Piping, Fittings, etc.

Whatever your requirements, Graver can serve you most efficiently. Send for Literature Today.

GRAVER TANK & MFG. CO., INC.

75 Years of Dependable Service

New York, N. Y. East Chicago, Ind. Chicago, Ill. Catasauqua, Pa.

approximately halfway between Montreal and Ottawa, it is about the most perfect spot for enjoying a thorough rest and forgetting the cares and worries of everyday life. It is associated with one of the greatest names in Canadian political history, for the territory belonging to the Seigniory Club comprises most of the old seigniory of Louis Joseph Papineau, who headed the famous uprising of 1837-1838, which led to the granting of responsible government to Canada. And nearby, within a stone's throw of the Log Chateau, still stands the manor erected by Papineau in 1850. It has been converted into a Club House for the members of the Seigniory Club, while at the same time retaining as far as possible the atmosphere of the period when it was inhabited by its illustrious owner.

The Club is located within convenient motoring distance of a number of pulp and paper mills. So on Friday and on Saturday morning the delegates divided into small groups, and visited at their convenience the felt plant at Lachute of Ayers, Ltd., large producers of paper machine felts; the mills of Maclarens, Ltd., at Masson and Buckingham, the sulphite and paper mills being located at Masson at the mouth of the Lièvre River, while the groundwood is produced three miles inland at Buckingham beside the power plant, and is piped in slush form to the paper mill; the huge, self-contained 700-ton pulp and news print mill of Canadian International Paper Co. at Gatineau and the adjoining mill of International Fibreboard Co., where Ten-Test Board is produced; the mill of the E. B. Eddy Co., at Hull, where an exceptionally complete line of fine papers are turned out; and finally, the mill of the J. R. Booth Co., just opposite the Eddy mill on the Ottawa side of the river.

These numerous points of interest did not make the golfers forget that there was the McInnis Trophy to compete for. And in addition the *Pulp & Paper Magazine of Canada* this year donated a very handsome trophy to be awarded to members of the same mill turning in the lowest average net score. So on Friday afternoon these enthusiasts hied themselves to the beautiful, interesting and somewhat tricky course, where they drove the balls around to their heart's content.

At the dinner on Friday evening the prizes were awarded as follows:

McInnis Trophy: Newton C. Candee, Howard Smith Paper Mills, Cornwall.

Runners up: Dr. Harold Hill, Price Bros., Quebec; J. J. Harpell, Garden City Press, Gardenvale, Quebec.

Pulp & Paper Magazine Team Trophy: Gatineau Mill of the Canadian International Paper Co. represented by R. M. Drummond and L. E. Kendall.

In addition, a sweepstakes contribution had been included in the green fees, and as a result golf balls were distributed to the following: Dr. Harold Hill, J. J. Harpell, S. Babbitt, E. D. Hyndman, Dr. Camsell, Fred Wrangel, Allistair Grant, and last, but not least, Dr. G. Larocque, who won the consolation prize, which also was a golf ball.

Saturday forenoon the party regretfully dispersed, but brought away happy memories of one of the most interesting, enjoyable and successful meetings ever held by the Section.

◆

▶▶▶ THE NEW ENGLAND FREIGHT ASSOCIATION has docketed a proposal to classify gummed paper tape, backed with asphalt and reinforced vegetable fiber, the same as regular gummed paper tape. The Association has also proposed to grant drawing, not less than 60 per cent groundwood, the same rates as pulpboard, strawboard, and similar papers of no greater or less value.

LUNKENHEIMER

IRON BODY GATE VALVES

6 inch
Fig. 1430
I. B. B. M.

Recognized for their dependability and long service life, they effect substantial reductions in maintenance expense.

Available in
Bronze Mounted and All-Iron;
Inside and Outside Screw
and Quick Operating;
for all service requirements.

Stocked by
Lunkenheimer
Distributors

ESTABLISHED 1862
THE LUNKENHEIMER CO.
"QUALITY"
CINCINNATI, OHIO, U. S. A.
NEW YORK CHICAGO
BOSTON PHILADELPHIA
EXPORT DEPT 310-322 HUDSON ST, NEW YORK

CONVENTION PAPERS

. . . . Abstracted

Efficiency In Paper Making

B. L. KASSING, Paper Mill Supt.
Hammermill Paper Co., Erie, Penn.

Increased efficiency results only from a constant study of conditions, and a consistent application of common sense, technology, and hard work. Technically, and in simple terms, efficiency refers to the ratio of the output of a machine to the input.

First, in considering the input, we naturally think of our raw materials such as pulps; then our auxiliary materials such as size and alum, colors and fillers; then operating supplies including felts and wires. Next, we may think of the labor employed to operate the process; then power and steam costs, and lubricating costs. Finally, we may think of indirect costs such as clean-up labor, broke handling and similar expense jobs. All these, and perhaps others, constitute the input of our process and machines.

The output consists of tons of paper of some quality. Tons produced are easily measured, but quality cannot be so easily determined.

Although we have established the input and the output of a paper machine, we are still unable to calculate its efficiency. To get at efficiency as related to quality, it is necessary to set up quality standards and measure variances from these standards. Today, in fine paper manufacture, many orders carry a buyer's specification in one or more qualities.

Our problem is usually to make more and better paper at lower cost with what we have. If this can be done or done in part, we have improved efficiency.

A mill devoted to a single product such as news can be tailored to the job. This is not the case in a specialty mill, where the same machine may make a variety of papers in the course of the day. In such a case, efficiency, both as regards quantity and quality of output, depends greatly on the personal skill of the operators, capable supervisors and technical control.

Efficiency in paper making begins first in the proper selection of materials, followed by the proper blending and intelligent processing of these materials, and finally by conversion of these materials into the finished paper.

Active intelligent supervision must be provided at all times. Such supervision supplies the means of maintaining standards, the extra, experienced brains needed in emergencies, and the authority to deviate from standard furnishes and treatment when necessary. Intelligent people, in my experience, are more co-operative, and co-operation by the members of a beater crew among themselves, and with the machine crew, is of inestimable importance in maintaining and improving efficiency.

A system of reports is of great value in a beater room, but must not be unwieldy.

Standards in the machine room mean that we should have standards for machine speeds, and maximum limits for normal interruptions in production such as wash-ups, wire changes, etc. Supervision in the person of the tour boss is absolutely responsible for quality. Inspection, both by maintenance and paper making supervision is desirable to prevent lost time.

The importance of the spirit of the machine crew cannot be overvalued. I have found it desirable to have each machine tender report the condition of his machine in writing. A report by the tour boss which is received by his relief makes supervision continuous and makes certain that each tour boss is familiar with what has happened, what may happen, what has been done, and what may have to be done.

The amount of planning required will depend largely on the diversity of grades, colors, weights, and sizes made, and the amount carried by the mill, and ordinary service requirements. Planning includes the scheduling of colors and grades in such order that the minimum changes are required, and that maximum deckles are obtained.

With steam, we should avoid waste by leaking valves or radiation; endeavor to obtain highest possible dry test leaving our presses, recover condensate, and use dryer felts which assist drying rather than hinder the process.

With lubrication costs, it is worthwhile even in a moderate size mill, to have one individual systematically study the problem.

Power costs usually represent a considerable part of conversion costs. Reduction of such costs is a problem usually requiring some engineering, and frequently a capital outlay.

I have found it advantageous to examine a strip from every wire when removed in addition to any crack, bung, sewed spot, or other defect. Whatever the cause of failure, the problem can be attacked intelligently only if we first decide on the cause. A complete chronological record of wire service is invaluable in studying wire service.

It is desirable to examine the fourdrinier frequently for rolls out of level or out of line. At the same time, we should look for defective roll coverings and poor bearings.

Efforts must be made to reduce friction on the wire, particularly at suction boxes. Slippage of the wire at the couch is also a serious point of wear.

A complete record of wire service should be compiled in order that differences between wires and machines can be detected and studied.

Press felt service should be studied exactly as suggested for wires, even though felt costs are lower than wire costs. The necessity for felt washing varies from once a week, perhaps, to every day.

Dryer felt costs are important. Proper ventilation of such felts will increase their life.

A device which has helped in improving clothing service is the preparation of a budget sheet for clothing. Still another thing which has helped in reducing clothing costs—acquaint your crews with the value of clothing and its cost per day and per ton.

Efficiency also may be improved by reducing the amount of broke made. Legitimate broke consists of the necessary winder trim, or broke made in changing weights, colors or finishes. Other broke is illegitimate and it is this class of broke which must be studied. Excessive trim necessitated by grainy edges should be considered as illegitimate broke.

Defects or faults which are indicated after the paper is made is another type of inefficiency. Such faults may show up in the finishing operation or even in the hands of the user or consumer. This type of inefficiency is an exceedingly hard one to handle.

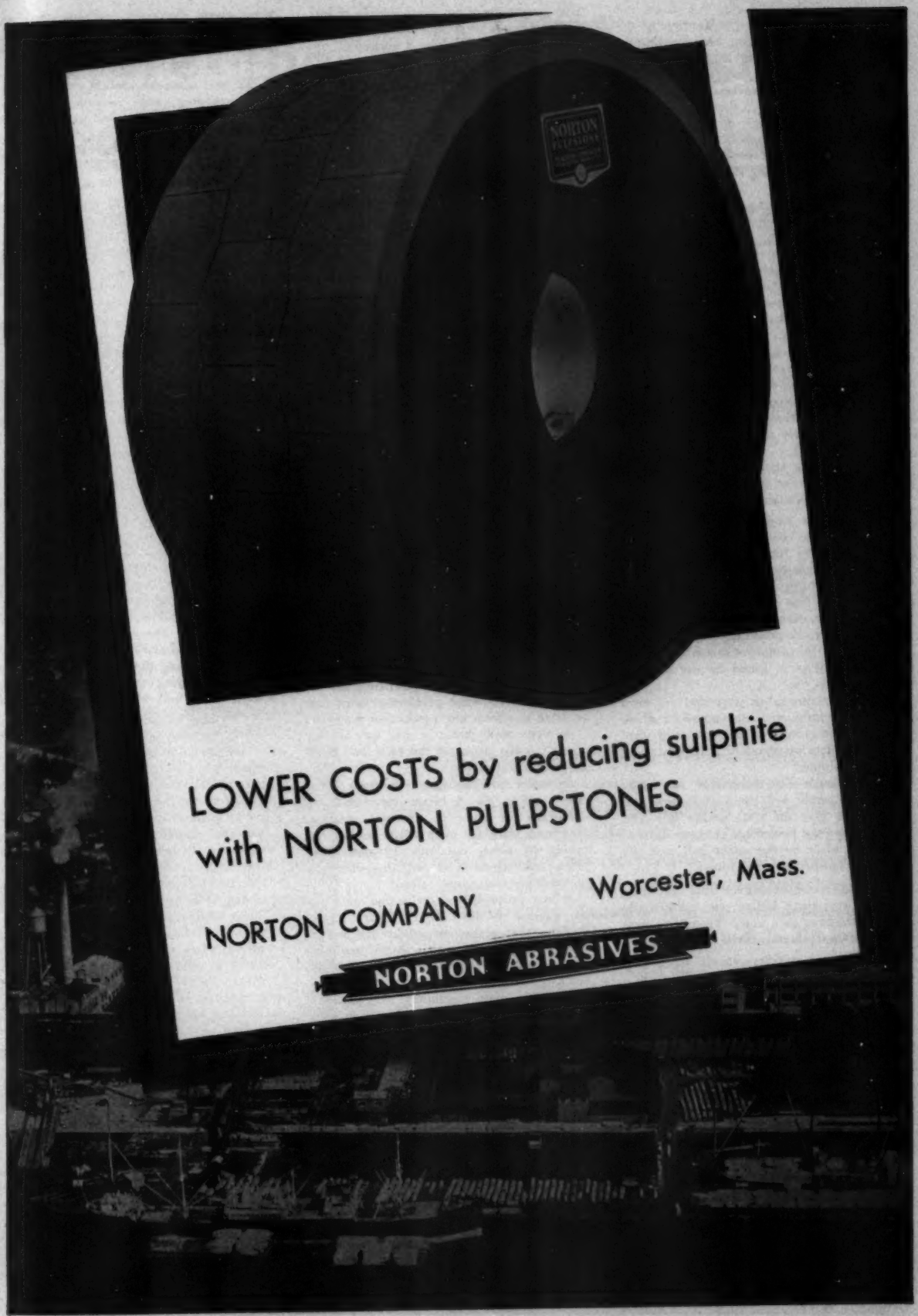
It appears that increasing efficiency in a paper mill is no simple task. The very nature of paper, the raw materials, and processes used, preclude such a condition. On the whole, however, slowly but surely efficiency is increasing. It will continue to increase as we think more, do more, and exchange ideas.

Continuous Grade Costing In a Paper Mill

DONALD ROSS-ROSS, Chief Indust. Engr.
Howard Smith Paper Mills, Ltd. and
Subsidiary Companies

Cost should provide: (1) a means for determining selling prices where these are not already established by custom or competition, (2) comparisons where prices are otherwise fixed as to which products are profitable and which are not, (3) comparisons of performances between the makings of the same product at different times, and (4) an analysis of where and by how much costs have varied from standard. They also should show, in the case of paper making:

The accompanying abstracts are of papers presented at the 19th Annual Convention of the American Pulp and Paper Mill Superintendents Association, June 22-24, Toronto, Canada.


LOWER COSTS by reducing sulphite
with NORTON PULPSTONES
NORTON COMPANY
Worcester, Mass.
NORTON ABRASIVES

(1) cost of fibre and clay lost down the sewer on a run, (2) cost of the time of the machine wasted in making broke getting on to the order, (3) cost of depreciation in the value of the raw material by turning it into broke in starting up a machine, (4) cost of making broke in the finishing room, and (5) costs in excess of, or better than, what are considered good practice relative to fibre losses, ash content, clay retention, incorrect proportioning of materials in the beaters, and so on.

It is extremely important that the cost accountant, in developing a cost system for any definite type of manufacture, should review the problem closely and build up a method to give accurate results. But it should be pointed out, at the same time, that overemphasis should not be made of unimportant details.

Where there are a number of mills belonging to an organization and various manufacturing departments to a mill, it is essential to make a very careful survey of the entire organization and to properly allocate these various items of burden equitably and properly to the respective manufacturing centers.

Grade costing should be designed so as to give a wealth of useful operating data—not just plain, ordinary costs.

A run of a single grade and color is covered by one cost. The first step is the obtaining of the furnish quantities and this is done by means of any suitable beater room report form. Machine broke must be recorded and this is done on another form. Machine operating data is obtained from the machine room production records. Other information to complete the cost and its various analyses is found by use of tachometer charts, etc.

The remaining work is carried out on a Grade Cost form, with one exception, where a calculation is made at the bottom of form recording data on standard fibre losses and slushed sulphite.

The furnish cost (corrected for broke credit), together with the machine time and order cost give the total jumbo roll cost. Multiplying the percentage of paper finished to paper made by the jumbo roll cost, the value of finished paper is found.

Mill operating executives have very little control over price selling, etc., particularly superintendents as a rule. Therefore, their main interest should center about efficient operations.

A paper machine affords so many opportunities for relatively costly losses. It is the object of the Variance Analysis, forming a portion of the Grade Cost Analysis, to show such losses or gains up clearly.

The work does not finish with the completed cost. Essential information only is abstracted on a Summary Form of which there is a sheet for each grade and color, all sheets being suitably bound and indexed. As a cost is completed, it is entered on the correct sheet and its results can be compared with previous runs very easily.

At one of our mills, the Cost Department has to handle about 160 costs per month. Added to this, it is required to prepare quite a few cost estimates for new business and for special purposes. The staff consists of two young men and two girls.

The costs have been extremely beneficial. They have pointed out many sources of loss. The magnitude of these losses can be found on our Critical Analysis, a statement prepared by all mills monthly and which is sent in with the regular monthly Manufacturing Cost Statements.

The Development of Modern Wage Incentives

ALEXANDER STRONG
Roth & Strong, Inc., Boston, Mass.

The development of wage incentives, as a more scientific means of exercising an intelligent control over labor costs, has covered a period of 25 or 30 years. Clumsy as Taylor's clerical records may seem today, by comparison with present practice, they were the first attempt to analyze production records for purposes of control of labor costs, and undoubtedly started Management thinking constructively about the whole problem of elimination of idle time as a serious item of cost.

Since the advancement of that original idea, there have been many "systems" developed, some very simple and some quite complicated. The success of these various methods has varied, depending principally on effectiveness of presentation to employee, adaptability to different conditions, and the relative accuracy of its basic information. Of these major items, effective presentation of any wage incentive to the employees who are going to work under it is the most important, and, especially under existing labor conditions, the most difficult.

The question of adaptability, or flexibility in adjusting the method of control to varying industrial problems, has been most easily solved, and today practically all of the well-known wage payment systems can be fitted to almost any production problem.

A time study man is first of all an observer. He must get the facts and then properly evaluate them.

In order to minimize the chance for error, and to give a better opportunity to determine the cause of variables, modern time study methods require that continuous timing be done, not only by individual pieces, but frequently by individual elements of work on each piece.

It was probably the realization of what the pursuit of the "element" idea might lead to, that really opened up the whole subject of rate setting to scientific analysis, and has brought the study of control of all labor costs to its present state of development. The most significant fact that becomes apparent through a comparison of a careful time study and the production actually turned in on the same job, is the wide discrepancy between what seems to be possible and what has been obtained. The problem in the control of excess labor costs, therefore, becomes one of analysis as to the causes of the excess, and the means of its elimination.

One of the most recent developments has been the carrying of the "element time" idea to the point where satisfactory coverage can now be obtained on non-repetitive work. Another development of the same fundamental principle is in work now being done by technicians on motion study and motion time analysis.

It is axiomatic to industrial engineers that, given the right incentive, any individual will do anything of which he is mentally and physically capable. The problem is to determine the right incentive.

We have often set rates on sorting, counting, wrapping, and packing operations, without much difficulty and generally with excellent results. In the case of some other finishing operations, such as cutting and calendering, it is neither as simple to set correct rates not as easy to get results.

It is when we come to the operation of the paper machines themselves that all previous theories about the measurement of individual performance seem to break down. If this kind of work is to be covered, it must be done by the method known as a "process application"; rates must be set for the crew as a group, in terms of the quantity of good paper made; and standards must be determined by the capacity of the machine on various grades, rather than on the capacity of the individuals to perform work.

Actually if the hourly cost of operating a paper machine is figured, including all such items as power, steam, interest on the investment and depreciation, it will be realized that, of the total, labor cost is one of the least important, and the most vital factor in economical operation is to get a greater volume of good product over which this heavy overhead can be distributed.

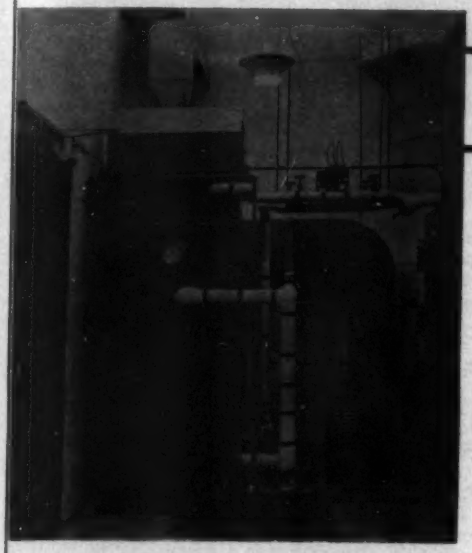
A beater crew's duties consist principally in supplying the beaters with the proper furnish, and dumping. The main difficulty in covering this work with satisfactory rates is due to the extreme flexibility required of the crew, and this can be taken care of by putting the whole crew into one group and paying them on the basis of pounds in, or out, whichever is the easiest to check.

There are two other groups of labor in the average mill that offer very real opportunities for cost reduction, if they can be satisfactorily covered. The first of these is in storage and shipping, which is often used as a reservoir for surplus help. The other large expense is maintenance labor, and we do not believe that the best answer to the control of that has yet been developed.

Today, more than ever before, it is essential that both management and labor have a better understanding of each other's problems. Next to job security, the thing that every man is most interested in is his week's pay. One of the principal reasons for labor trouble in recent years has been the inability of management to maintain a close enough contact with the individual employee to find and eliminate sources of irritation before they become of major importance.

The establishment of wage incentives is not an exact science; nor is the profession of industrial engineering static. No two problems are ever quite the same in all details, even on the same type of equipment, or the same kind of work, or in the same industry. Consequently, with varying conditions, study of those details and analysis of the facts obtained is absolutely essential if the correct answer is to be found. And last, although technical knowledge is of tremendous value in the study of any situation, there is never any substitution for plain common sense.

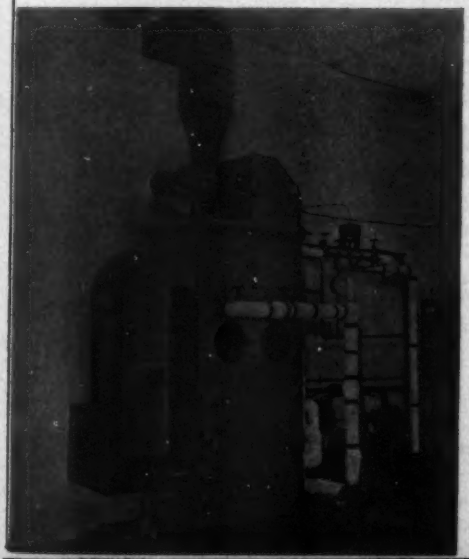
Figure the yearly cost of *spoilage* due to atmospheric changes in your mill . . .



Views of Ross Air Conditioning Unit for Paper Mills

and you will better appreciate the investment value available from complete

ROSS Air Conditioning Apparatus



Ross air conditioning systems insure positive control of both temperature and humidity—at all seasons—within any predetermined condition required. Designed, built and installed by an organization with a quarter century of experience with paper mill problems—Ross apparatus definitely eliminates damage due to atmospheric changes—cracked, curled, "wet stock." By improving quality of products and preventing spoilage—the equipment pays for itself out of savings effected.

Get our reliable recommendations for equipping your mill to successfully meet the demand for "mill conditioned stock"

J. O. ROSS ENGINEERING CORPORATION

Main Office—350 MADISON AVE., NEW YORK, N. Y.

201 North Wells St. CHICAGO — 12953 Greeley Ave. DETROIT — 2860 N. W. Front Ave. PORTLAND, ORE.

IN CANADA — ROSS ENGINEERING OF CANADA, LTD. — DOMINION SQUARE BUILDING, MONTREAL

Operating Results of the New Type Black-Clawson Wet End

L. E. WEISER, National Folding Box Co., New Haven, Conn.

In 1937 an extensive modernization and rehabilitation program, which, among other things, included the installation of a new Black-Clawson wet end for our 143 in. No. 1 board machine, was completed. Selection of the Black-Clawson wet end was based on an exhaustive study of various vats and auxiliary equipment available and particularly upon a demonstration by one progressive mill, which was operating Black-Clawson Uniflow Vats with considerable success, of the way in which these vats crossed stock fibers by using a slide projector. Our wet end as finally installed has seven Uniflow Vats, two primary suction rolls and one suction main press. The long pick up felt runs in the forward direction and the short bottom felt comes back as far as the first primary suction roll. In order to make room for the seven vats, one finish press had to be eliminated from the machine, leaving only one finish press for each side of sheet. This change has not resulted in a sacrifice of finish but rather in some instances, a better finish is being obtained now than before. Felt marks are noticeable by their absence. A much better sheet in all respects with about 2 per cent more bulk is being produced. Felt costs are running some 30 per cent under previous costs and further reductions are anticipated. Our formulas today contain about 35 per cent less sulphite than formerly; yet the present sheet has better foldability than the old board. The new wet end is extremely flexible, permitting changes from lightweight to heavyweight board or vice versa without any evidence of either "checks" or "felt picks." It also produces an exceptionally uniform and well formed sheet. Then too, the suction rolls and vacuum system extract more water from the sheet than was possible under the old system. The sheet is now delivered to the dryers 34½ per cent dry as contrasted with 30 per cent formerly. Our experience indicates that Uniflow Vats are most efficient when forming not over five points per cylinder—our best results being obtained around three points per cylinder. Any one considering the installation of a new wet end should give careful consideration to the number of moulds required and, if much heavyweight board is to be made, should provide, in our opinion, not less than eight of them.

Effect of Starch on the Printing Quality of Board

A. YRAOLA, Chemist, Hinde & Dauch Paper Co. of Canada, Ltd., Toronto, Ont.

The use of starch to improve certain qualities of paper was known to the Chinese and Arabian papermakers of the eighth century. It continued in use until the fourteenth century, when it was replaced by glue as a sizing agent. In the nineteenth century, after the invention of the paper machine, starch again came into use in almost all grades of paper and board, as an assistant to rosin in sizing, to improve smoothness and feel and prevent fuzz, and to improve the snap of the sheet. New advantages obtainable by the use of starch in board have been found to meet conditions imposed by development of high gloss inks during the last year and a half in the inks during the last year and a half in the carton printing industry. Starch used in the liner furnish in amounts greater than usual for ordinary grades of printing board improves the hardness or pick test, and decreases the oil absorbency sufficiently to produce a satisfactory result with high gloss ink. Under our mill conditions, more than two per cent starch does not seem necessary to produce a board that will meet satisfactorily any condition of high grade carton printing. It is probable that if much more than two per cent starch were used, special inks would have to be made up to obtain satisfactory results in regular operations. These results were obtained with corn starch boiled before adding to the beater.

Calender starch has a definite effect on the feel and gloss of board liner, and application of calender starch can eliminate loose fuzz and improve resistance to scuffing. It also has an effect in decreasing ink absorption, but it does not add enough resistance to stresses vertical to the board surface to prevent picking of the board liner by high gloss inks or other similar conditions in cases where the board liner coming over the machine is not sufficiently strong and hard.

Control of the resistance to picking of the board by the use of the necessary amount of starch in the beater for the printing conditions that the board must meet make it unnecessary for the board mill operators to lower the folding quality or any other similar property of the sheet to obtain a liner sufficiently hard or non-absorbent to ink to produce a satisfactory printed job.

In addition to the use of high gloss inks there have been other recent developments in the carton industry, such as increased speeds, all over varnishes, and the increasing use of offset presses. All these uses for boxboards impose more severe conditions of picking on the liner of the board.

Not long ago a situation involving excess acidity arose in connection with a large order of board being printed on a high speed offset press. We found that, to make a board sufficiently low in excess acid, the liner pH on the machine should be about 6.0.

Recovery of Heat and SO_2 Gas in the Sulphite Pulp Industry With or Without Heat Exchangers

C. ROSENBLAD
(Read by Baron C. M. Hermelin)

The object of using acid of high strength and temperature is four-fold—(1) to obtain better penetration of chips, (2) to decrease cooking cycle, (3) to decrease screenings, and (4) to obtain a more even quality of pulp.

Increase in strength and temperature of the raw acid, in the direct method, is accomplished by injecting the relief gases into the acid directly from the digester without any intermediate cooling. The gases from the low pressure relief are injected to the cool raw acid by means of an injector or an absorption tower. After this first treatment, the acid is taken to a pressure tank. Gases, relieved from digester in the pressure range of from four to two atmospheres, also are injected into this tank. The acid is finally pumped from this pressure tank to a high pressure tank which also receives relief gases from the digester at full pressure down to about four atmospheres. The system is characterized by big acid tanks. Comparatively high pressures have to be used and further the relief time will be long if the sulphur is to be effectively recovered.

Acid is concentrated, in the indirect method, to full strength in cool condition by means of cooled gases from the digester relief. The cool acid which has been concentrated to full strength by said cooled gases is thereafter heated indirectly by means of heat liberated when the digester is relieved and blown.

It is important to increase the acid temperature as much as possible by means of recovered waste heat. The amount of heat which can be recovered is dependent on the final digester temperature and by the water equivalent of the digester contents. According to American practice, where the digester is blown at a comparatively high pressure, practically all SO_2 and, at least theoretically, all heat above 212 deg. Fahr. (100 deg. Cent.) can be recovered and used for heating the cooking acid, provided, of course, that no cool water is injected when the blow takes place.

It is advantageous to advance the acid temperature in a central plant by means of live steam to as high a temperature as possible. The heating surface in a central acid heating plant can be utilized up to 100 per cent of the time and continuously at full capacity. The heating surface connected to each digester is utilized maybe only 60 per cent of the time and an average at only 50 per cent capacity. Thus the upper limit of the acid temperature before entering the digester is determined by its effect on pulp quality. Some pulp men claim that 165 deg. Fahr. (74 deg. Cent.) should not be exceeded. Others claim that the acid could be heated up to 215 or 230 deg. Fahr. (102 to 110 deg. Cent.).

If the question of saving time is of minor importance, it is possible to substitute a number of heat exchanges in the heat recovery plant for the acid pressure tank and thus heat the total quantity of acid to the desired temperature during the time required to fill the digester.

The two different methods for obtaining a strong acid at high temperature, direct or indirect, have been treated contrary to each other. The combination of the two is possible and many such combinations are used at different plants. However, it is probably impossible to make such a combination without jeopardizing the quality of acid or the top result from the indirect heating.

A Comparison of the Modern Methods of Coating Paper

PAUL DE GUEHERY
Michigan Paper Co., Plainwell, Mich.

Advantages of brush coaters, equipped with festoon air dryers, may be listed as follows: (1) good adhesion of pigment,

ORR FELTS

Faster Water Removal – Longer on the Machine

You watch finish costs. You watch steam costs. You check this . . . and that. You should.

But do you watch your felting costs? That also is a major production expense as every superintendent knows only too well.

Are you getting maximum water removal and are your felts holding up the way they should? Find out! Study and check the kind you are using today, then try Orrs and make the necessary comparisons. More than one mill has done this and cut their conversion costs down another notch then and there.

The Orr representative will be glad to cooperate.

THE ORR FELT & BLANKET CO.
PIQUA, OHIO

Announcing the
Black-Ray Quartz-Arc

• A powerful source of short wave ultra-violet radiations. • Makes possible accurate examination and comparison of finished papers. • Permits rapid and accurate titration of colored cooking liquors. • Allows visible observation of many normally unseen chemical reactions. • Aids in the measurement of chlorine number. • Gives almost instantaneous end point in test of sizing value. • Reveals inequalities in dyeing. • Affords a rapid and accurate means of determining grease penetration.

Get all the facts! Write today for FREE Bulletin giving full details and prices.

BLACK-RAY LIGHTING CO.
10415 St. Clair Ave. Cleveland, Ohio

(2) comparatively good control of weight of coating, (3) wide range of coating weight possible, (4) wide range of type and characteristics of coating possible, (5) operation simple and equipment cost comparatively low, (6) changes in grade, weight and color of coating easily accomplished, and (7) paper in process subject to close and thorough inspection while machine is in operation.

Inherent disadvantages of brush coaters equipped with festoon air dryers are: (1) speed definitely limited, (2) practical width limited, (3) not well adapted to coating of paper which has tendency to curl or pucker when wet, (4) coating cost per ton, as well as the waste, increase very decidedly as weight of raw stock decreases, (5) festoon rack not versatile in matter of raw stock weights, (6) brush coater not easily kept clean, (7) brush marks, hair marks and color lumps frequent sources of trouble, and (8) if not properly operated, brush coater has tendency to rub up fuzz on paper.

The roll coater has removed some of the disadvantages of the brush coater; but it too has certain disadvantages, among them—(1) rolls easily fouled and require frequent wash up, (2) close control of weight of coating difficult, (3) operation and adjustment of machine by no means simple, (4) versatility of machine with respect to range characteristics of coating rather limited, (5) range of weights of coating very limited, (6) generally speaking, machine does not lay down as level a coat as well operated brush coater, and (7) time required to change weight and grade comparatively large.

The air brush coater, developed in an effort to eliminate speed limitations of the brush and roll coaters and, at the same time, minimize the effects of fouling, is said to be very efficient and versatile and offers no reasonable limitations so far as speed is concerned. To gain the advantage of the high speed of which the coater is capable, the high speed dryer was developed. The combination is said to do very fine work at speeds up to 600 feet per minute. Its essential disadvantages may be charged to the uncertainties and hazards of high speed drying.

A device of which coating men have dreamed, off and on, for the past thirty years or more consists of a large, highly polished, heated, cylinder dryer attached to the end of a coating machine. A modification of this machine prints or sprays a coating directly onto surface of the cylinder and subsequently transfers the film, thus created, onto a moving web of paper.

Another recent development is a machine which, in effect, prints a heavy slurry of pigment and binder onto the sheet. The machine may be operated as a straight coater in conjunction with any sort of dryer; but it is well adapted for use with the conventional type of dryer commonly used on paper machines.

The flow-on coater, strictly speaking, is not a coater since it does little more than put a thin film onto the surface of the wet web as it passes over the wire of the paper machine. Essentially, the machine consists of a feeding roll and slide mounted in an easily variable position over the wire section of the paper machine. The coating material is picked up out of a trough by means of a separately driven feeding roll whence it is scraped onto the slide by a suitable doctor. The slide is provided with a series of ripple-breaking flutes at its lower end and is so arranged that the thin stream of coating material coming from the feeding roll may be made to slide down onto the paper at exactly the same speed at which the wet web is traveling, thus eliminating all tendency to distort or scuff the wet sheet.

The Development of the Art of Trimming Paper

HOWARD M. HUBBARD, Sec.-Treas.
Harris-Seybold-Potter Co., Cleveland, O.

The importance of accurately cut paper to the effective use of modern high speed printing equipment with hair line register emphasizes the need of the most accurate cutting machines that money and engineering skill can develop.

It was formerly the practice of paper mills to divide large piles into smaller piles by hand, i. e., a small list of material was placed on a table, held down by hand and by hand also the cutting knife was drawn through the pile.

The next step in paper trimming was the lever cutter. In this instance, piles were held firm by a clamp actuated by a screw and handwheel while the knife was forced through the stock by a hand lever.

After the lever cutter came the hand clamp power cutter. This machine differed in the fact that the knife was driven by power. Even this improvement fell short of supplying all that modern production demanded.

Again the engineering department of the equipment manufacturer met the situation by developing a fully automatic cutter and in such capacities as to permit the trimming of a 94 in. sheet. These automatic clamp cutters required no manual operation other than the determination of the line of cut. All operations, after this determination was made, were automatic. The clamp was automatically compressed on the paper, the knife automatically drawn through the pile and both movements automatically returned to an idle position when the cut was completed. In speed, the automatic clamp mill trimmer set a new standard. Only a few seconds were required to clamp the lift of stock and complete the trim.

Modern machines are equipped with simple devices to increase or decrease clamp pressures without loss of valuable time. Experiments at both the manufacturers plants and in the field have produced numerous variations of the flexible sole clamp which serves to distribute a uniform pressure over a pile of irregular height. The problem of fluffy paper has been met in various ways including the use of clamps with wide faced soles.

In addition to the automatic clamp, we have developed a trimmer equipped with an automatic back gauge. The initial application of this trimmer provided for uniform automatic spacing by purely mechanical means but later an electric auto spacer, which permitted automatic cutting at variable space sequences, was introduced.

The operation of a trimmer, equipped with an electric auto spacer, from the standpoint of the operator is unusually simple. On an electric carriage, synchronized with the back gauge, are movable contacts which can be set in combinations of spacing according to the work to be cut. Once the stops are set, the auto spacer follows the sequence, forwarding the work automatically after each knife stroke to the next cutting position. The spacer bars are not only four-sided, but quickly removable and easily replaced with other bars. It is thus possible to preserve the bar setups for repetitive use where the nature of the work warrants such practice.

Along with the advancement of such features as have been cited, the efficiency, speed, accuracy and safety of the mill trimmer has also been enhanced by the increased use of properly dimensioned knives. No matter how carefully the trimming machine is built, the use of improperly dimensioned knives undoubtedly will cause inaccurate cutting. This is why we have always stressed the importance of using knives made to suit the individual requirements of the machine.

Particle Size Distribution As It Affects Properties Of Coating Clays

S. C. LYONS
The Georgia-Kaolin Co., New York, N. Y.

The increasingly rapid development of machine-coating, or so-called "Process Coating" methods, has necessitated far-reaching developments in the technology of clay refining. Within the last five or six years, intensive, basic researches conducted by some of the leading U. S. clay producers, have begun to throw light upon certain features of the fundamental nature of clay.

It has been found that particle size distribution of a clay more profoundly affects its qualities as a paper coating pigment, than any other of its properties. If three samples of clay, each of identical color and chemical composition, but of different particle size, i. e., "Coarse," "Intermediate," and "Fine," be made up into coating "color" with casein, brushed out on sheets under uniform conditions, and dried, the resulting coated sheets will not be alike. The "Coarse" clay would yield sheets lower in reflectance and more yellow than the others. The "Intermediate" clay would produce sheets of slightly better reflectance and color distribution. The "Fine" would give brush-outs whose brightness and whiteness would be superior to those from either the "Coarse" or "Intermediate" clay.

It was found that when the sheets were calendered, their color was affected in reverse order—the "Coarse" clays suffering less loss of brightness than the "Intermediate" clays, while the "Fines" suffered most. Nonetheless, the final color obtained from the sheets coated with "Fines" was invariably better than with the "Coarse"—the combined loss in color during brushing out and calendering, in every case, being less for the "Fines" than for the "Coarser" clays.

Further experiments show that when using a pigment with as fine a particle size as titanium, which is considerably finer than that of clay, a mixture of 90 per cent clay and as little as 10 per cent titanium,

SINCE 1873

Supreme

Perkins Quality Rolls

The superior finishing qualities of Perkins Calender Rolls are the natural result of the broadest experience in this highly specialized field of manufacture.

Perkins roll shop is the largest in the world.

Perkins organization is always prepared to build your rolls to meet exactly your production requirements.

Perkins refills and remakes include the rolls of any manufacture, domestic or foreign, for any application in the paper industry.

B. F. Perkins & Son, Inc., Holyoke, Mass.

Engineers and Manufacturers

Cotton Rolls	Chilled Iron Rolls	Friction Calenders	Rag Cutters
Paper Rolls	Granite Press Rolls	Embossing Calenders	Stock Cutters
Embossing Rolls	Glassine Supercalenders	Mullen Paper Testers	Paper Dampeners
	Web Supercalenders	Tensile Testers	

the color of the composite is materially raised because of the effect of the smaller particles.

In making the tests upon which the previous deductions are based, the color of the clays and the coated sheets prepared from them was quantitatively determined by means of the Hardy Spectrophotometer or color analyzer.

The Hydrafiner For Beating

J. D. HASKELL, Vice President
Dilts Machine Works, Inc., Fulton, N. Y.

Efforts to find a short cut in the beating of paper stock have taken many forms and our patent file is full of revolutionary ideas, most all designed to eliminate beaters either entirely or in part. In the early years of the last depression, when there was little else to do, we started a program of development with the thought in mind of developing a unit which would supplement the beater and increase its efficiency and reduce the beating cycle. Our efforts focused on a compact, high speed unit, in which a great deal of work might be done in a comparatively small zone of action. As a result of much trial and error, the Dilts Hydrafiner in its present form was developed.

The Hydrafiner incorporates a small plug with a corresponding shell arranged for various combinations of fillings. The stock enters the small end of the plug, at which point we employ a volute impeller for forcing the stock into the spaces between the knives. Another function of the impeller is to neutralize the thrust and relieve the load on the main thrust bearing. In fact, under some conditions and with certain consistencies, the thrust is actually reversed; and it is much harder to back the plug out than it is to set it up.

At present, we are working with a recording instrument company in the application of a pressure recorder for actually reading the amount of thrust so that operating conditions can be duplicated.

Another mechanical feature of the Hydrafiner plug is its one-piece construction, the plug and shaft being a one-piece alloy forging. The plug and shell fillings as well as the impeller are of stainless steel; and the main Hydrafiner body is a one-piece gray iron casting with all machined surfaces bored at one setup to assure alignment. Other mechanical features include water cooled packing boxes, anti-friction bearings, and a heavy duty flexible coupling. Inlet and outlet connections are provided on both sides and at the top. Protective sleeves at the packing box points are of stainless steel.

All Hydrafiner plug and shell fillings are "ground in" before shipment and are ready to install in one piece.

We have Hydrafiners operating as continuous units both singly and in series with jordans. We have them operating as batch units connected to one or more beaters or chests.

The beater-Hydrafiner combination has proven to be highly desirable in box board mills for the preparation of liner stock and where color changes are frequent, as a small batch can be handled as effectively as a large one. In the beater-Hydrafiner combination, it is essential that size and alum be added just before dumping and here again the high speed of the Hydrafiner thoroughly mixes size, alum, color, etc., in one pass through and, if desired, the beater can be dumped through the Hydrafiner by utilizing the pumping action of the Hydrafiner's impeller.

We have installed a complete laboratory at our plant to establish a set of standards for all standard pulps and from this information we expect to compile figures on just what our equipment accomplishes on any of these given pulps. We believe that the purchaser of such stock preparation equipment has a right to know these facts and we propose to keep this end before us in the development of our equipment. Our laboratory is available to all paper mills and we would be glad to develop curves of your various pulps for comparison with your present methods of preparation.

Some Examples of Modern Finishing Machinery Development

HERBERT NOWELL, Com. Rep., Sir James Farmer Norton & Co., Ltd., Adelphi Iron Works, Salford, Manchester, England

It is the practice of all English mills in supercalendering newsprint to run the paper through the papermaking machine stack of all chilled iron rolls, damp with spray damper and reel on a drum reel. The reel is then taken to the supercalender which is placed directly after the papermaking machine. After supercalendering, it is necessary to slit and re-reel.

The usual arrangement of rolls in a supercalender is as follows: (1) top solid chilled iron, (2) woolen paper, (3) chilled iron, steam heated, or water cooled, (4) woolen paper, (5) chilled iron, steam heated, or water cooled, (6) cotton, (7) cotton, (8) chilled iron, steam heated, water cooled, (9) woolen paper, (10) bottom solid chilled iron.

An approximate English furnish for newsprint is 80 per cent groundwood and 20 per cent sulphite, no loading and sized with rosin size. Some newspapers only use supercalendered sheet for outside photo page, but the trend is to supercalender all newsprint owing to elaborate advertising photos on inside pages. The main reason for supercalendering the photo page is to prevent dusting during printing and, at the same time, to present an even surface. Addition of clay certainly weakens the sheet and increases dusting.

The approximate horsepower to drive a supercalender for a sheet 186 in. wide would be about 200 hp. The steam consumption would be about 250/300 lb. per hour for heating the bowls.

In the calendering of paper, the quality of the pressed rolls may mean all the difference between a grade A quality and a quality of no outstanding merit.

The cotton used in our rolls is the finest quality, Egyptian, and is treated on special carding machines, which comb out the threads and lay the cotton in the form of a fleece. After the carding process, the cotton fleeces are packed into circular cakes with a hole through the center corresponding to the diameter of the steel spindle of the roll.

The cakes are taken to massive hydraulic presses, where they are placed on to the steel spindle of the roll and pressed solid. On the ends of the calender roll are steel endplates, held in position by specially designed steel lockings. The pressure exerted on the roll varies according to the purpose for which the roll is required.

A variety of paper is used in the manufacture of paper rolls according to the particular kind of calender for which the rolls are required. We make paper rolls of woolen paper, flax paper, white linen paper, and brown linen paper.

On leaving the presses, after the requisite degree of hardness has been obtained, the calender rolls are turned in special lathes with specially designed tools.

The last process in the manufacture of our calender rolls is grinding. To insure accuracy, the rolls are supported by their journal necks during the grinding process.

The Control of Variables On High Speed Newsprint Operation

A. J. EDWARDS, Supt. Technical Serv. Dept., N. B. International Paper Co.

Paper machines at the Dalhousie mill of the Canadian International Paper Company have operated efficiently and continuously at speeds over 1400 feet per minute. The wood in use is of local growth and is a mixture of balsam fir and black and white spruce which is furnished in the same proportions to both the groundwood and sulphite mills.

The groundwood pulp carries the greatest responsibility in the drainage and formation of the sheet and general running conditions on the machines so extreme care is exercised to insure the production of a uniform pulp of the required characteristics. A long fine fiber stock containing a minimum of coarse bundles of fibers is the objective.

Artificial stones are in use with a burr of 10 cut by 1½ in. lead. The temperature of stock in stone pit is held uniform at 180 deg. Fahr. by means of special temperature regulator and recording equipment.

Control of groundwood production is carried out on stock from the bull screens, with a freeness on the Canadian Green Freeness Tester of 90 or slightly over being the objective.

The groundwood, after deckering and temporary storage, passes primary and secondary regulators and is furnished the paper machine mixers in a uniform flow of 2.60 per cent consistency and of 80 freeness.

The sulphite pulp is of a normal grade, and is cooked for a high yield with uniform quality, the grade being gauged by Roe chlorine number tests which fall between the limits of 4 and 6, corresponding to an average bleach consumption test of 24 per cent.

The sulphite is treated in temporary storage with alum and is then jordaned and furnished the paper machine mixers at a consistency of 2.33 per cent and with a freeness of 600.

Dry broke is jordaned and mixed with the thickened wet broke and then furnished to the paper machine mixers at a freeness averaging 141 and at a consistency of 2.56 per cent.

BUY COMPLETE PROTECTION

Not Just . . .
Surface Coverage

● Unlike ordinary paints, NITROSE penetrates through rust, grease and grime down to the bare metal, effectively stopping corrosive action. Stands up longer, too. Get the facts on this time-tested corrosion-resisting covering. Write,

THE NITROSE CO., INC.
PEORIA, ILLINOIS

RYERSON

Uniform High Quality—at No Extra Cost

The Ryerson Certified Steel Plan gives you definite assurance of getting steel which has the features most desirable in the particular kind you order. When you need steel of any kind, draw on the nearest Ryerson plant. Immediate Shipment is assured.

Bars, Shapes	Shafting	Welding Rods	Alloy Steel
Structurals	Tubing	Solder	Tool Steel
Rails, Plates	Boiler Fittings	Stainless Steel	Floor Plates
Sheets—Strip	Concrete	Babbitt Metal	Safety Tread
Rivets, Bolts	Reinforcing		

Write for the Ryerson Stock List

Joseph T. Ryerson & Son, Inc., *Plants at:* Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Jersey City, Philadelphia, Boston

Certified STEELS

RYERTEX BEARINGS
—CLEANER —LAST LONGER

They are water lubricated« »Consume less power« »Help produce cleaner stock« »Quickly replaced« »Will run submerged in pulp stock« »Last longer« »Practically unaffected by acid solution. *Write for Bulletin 42*

Joseph T. Ryerson & Son, Inc. Plants at: Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Jersey City, Philadelphia, Boston

RYERSON

At "Fernandina"
NEW ENGLAND MODEL WT AGITATOR DRIVE,

complete with "Nett-co" turbine stirrer and propeller, mixes pulp screenings at a consistency up to 4%.

Many paper mill superintendents have reported definite advantages resulting from the use of "New England" Agitators which have been engineered as a complete unit for their particular mixing job.

Have you a copy of Catalog 3807

NEW ENGLAND TANK AND TOWER CO. MAIN OFFICE AND WORKS **EVERETT, MASS.**

NEW YORK • CHICAGO • PITTSBURGH • ST. LOUIS • SAN FRANCISCO • LOS ANGELES • TACOMA • SPOKANE
SEATTLE • PORTLAND • DETROIT • VICTOR, N. Y. • NORFOLK • ROANOKE • ASHEVILLE • COLUMBIA

The resultant mixed stock has a consistency of 2.53 per cent and a freeness of 141; and, after thinning with wire pit white water, gives head box consistencies around 0.58 per cent with a freeness of 40 for the production of 32 lb. basis weight paper. With increased basis weight and clay furnish, the head box consistency will rise to as high as 0.75 per cent, a consistency secured for a 37 lb. paper with a clay ash content of 6.0 per cent, and under these conditions there is a change in the consistency of the returning white water from the wire pit.

The formation of the sheet is a very important factor with regard to its printing qualities. The most perfect formation is where the fibers lie almost evenly on their side in a horizontal position in every direction so that they intermat and cause a uniform thickness throughout the whole sheet, resulting in a high density and finished smoothness.

The presence of slivers in a sheet is a reflection on stock quality and can be corrected easily. Dirt, on the other hand, is a considerably harder problem to combat due to the multiplicity of its sources. Dirt showing up in the sheet may be specks of bark, dried pulp, oxidized bundles of wood fibers, sawdust, lime spots, undissolved alum, pitch particles, sand, clay, undissolved color particles, foam, slime of different natures and a hundred and one other substances.

The presence of calender cuts in a roll of paper in the hands of the publisher reflects immediately an improper inspection.

Wet streaks in the finished paper can be corrected and usually are by all manufacturers practically as soon as noticed.

The strength of a sheet of newsprint varies with such factors as finish, calendering, dryness, formation, stock furnish and pulp capacity, practically all of which can be controlled.

The head box can be a source of sheet formation trouble due to eddies, flocculation and the formation of lumps.

The Dalhousie high speed machine fourdriniers are equipped with a 26 in. diameter breast roll, 40 in. diameter suction couch, 20 tube rolls (10½ in. diameter on 13½ in. centers), eight suction boxes and a dandy. Several different types of wires have been tried with the result that a modified long crimp wire of 44 x 36 mesh, 228 in. wide, and 80 feet long was chosen as giving the most satisfactory service.

Nip pressures on the first press with plain suction rolls are around 86 lb. per lineal inch, while that on the rubber covered rolls on the second press are around 145 lb. per lineal inch. In general, any make of press felt will operate satisfactorily and, when installed, it is wet down according to general practice. No chemical solutions are used for washing felts. In fact, no washing of felts is carried out. Occasionally, however, a first felt may be turned if plugged up a bit on the surface.

All of our machines operate without dryer felts on the first seven bottom dryers.

Water cooled sweat dryers and spring rolls in conjunction give a better finish to the sheet due to the condensed moisture entering the sheet at these points just before the calender stack.

Finish is secured with a 34 in. diameter bottom calender roll carrying a crown of .048 in., a 22 in. diameter intermediate roll with a crown of .005 in., and six 16 in. diameter top rolls without crowns. The stack is ground at intervals of from 4 to 6 months.

The testing control of the finished paper can be carried out at the reel, including tests on moisture, basis weight, Mullen, caliper and density; while formation, dirt and smoothness tests and outturn samples should be secured from rolls after winding and prior to wrapping.

A systematic practice in securing of tests and temperatures at different points in the plant and in noting the presence of accumulations, such as slime, pitch, and foam, will give an experienced observer a definite idea of troubles of various natures to expect and will place him in a position to be able to rectify them before they take place.

It is well also to draw particular attention to the finishing, handling, storage and shipment of rolls of newsprint paper. These operations must be carried out in such a way that the paper will be protected properly and will reach the consumer in as good condition as when leaving the paper machines.

Screening Pulp Fibers

NELSON M. KNIGHT
Mathewson Mach. Works, Quincy, Mass.

The substances detrimental to the making of paper and which should be removed from the pulp fibers before their final conversion into sheet form can be divided into three classes—(1) those of a higher specific gravity than pulp fibers, (2) those of the same specific gravity, and (3) those of a lesser specific gravity. Once a particle of dirt has been introduced to the slot or perforation of a screen plate, it must be removed immediately. Otherwise, it may be forced through or become lodged there.

Mechanical pressure and scrapers are detrimental to the plates and have a tendency to break down the dirt. Water will dilute the stock but is an added expense to operation. Suction, on the other hand, has a fairly mild action and draws the dirt away from the plate without contacting them.

In our particular case, we generate the suction by mechanical means within the screen so that each and every slot or perforation is thoroughly cleaned after each screening pulsation. This unit is made up into a series of so-called runners which encircle the outside of the screen cylinder. The design is such that by rotating the runners slowly a vacuum is created on the underside of each, drawing the dirt away from the plates. The following runner picks it up on its outer surface and rejects it back to the supply chamber from which it came, to be carried by natural flow or gravity to the rejection chamber of the screen.

The position of screen plates play an important part in screening. If the plates are of cylindrical design, there is but one logical position in which they can be placed to reduce the possibility of dirt coming in contact with them. That position is vertical. By totally submerging this screen cylinder, the maximum screening efficiency is acquired.

During the experiments with this screen, we found that by running consistencies in the vicinity of ½ of 1 per cent, the quality of accepted fibers was greatly improved over that of higher consistencies. On the other hand, if the consistency is greatly under that of ½ of 1 per cent, dirt will be more prevalent than at any other time.

When using slotted screen plates, we found that the position of the slots in relation to the flow of stock had its advantages for retaining the dirt. If the slot is parallel with the flow, and the slot is one and one-half inches long, the dirt has one and one-half inches of travel to contact the slot; whereas if it is at right angles, and the slots are ten-thousandths of an inch cut, the dirt has only ten thousandths of an inch travel to contact a particular slot.

By installing the mechanical screening element on the side of the screen plate with the accepted fibers, the hazard of breaking down the dirt is reduced. Our screen cylinder is mounted on rubber so that the force created by the pulsation delivered part of the load to the screen cylinder is transferred to the rubber. The rubber serves as a relief for the excess pressure and will only draw the desired fibers through.

By maintaining clean slots of perforations at all times, slime is eliminated from the screen plates. Having the mechanical pulsation element located on the accepted side of the screen plate also is an assurance against slime.

The stock heads of the screen are controlled by gravity flow. The accepted discharge head will be several inches lower than that of the supply.

The screen is equipped with a 25 hp. motor. In most cases, the power consumption will be 20 hp. or less.

The capacity of this screen, equipped with .012 cut slotted plate, on sulphite brown stock will be about twenty-five tons per twenty-four hours. This screen, equipped with .055 perforated plates, will handle about seventy-five tons of the same stock per twenty-four hours. Rejections in all cases will run from 1½ per cent to 2 per cent of the supply.

Maintenance of Paper Machines and Equipment

GROVER KEETH, Chief Engineer Marathon Paper Mills Co., Rothschild, Wis.

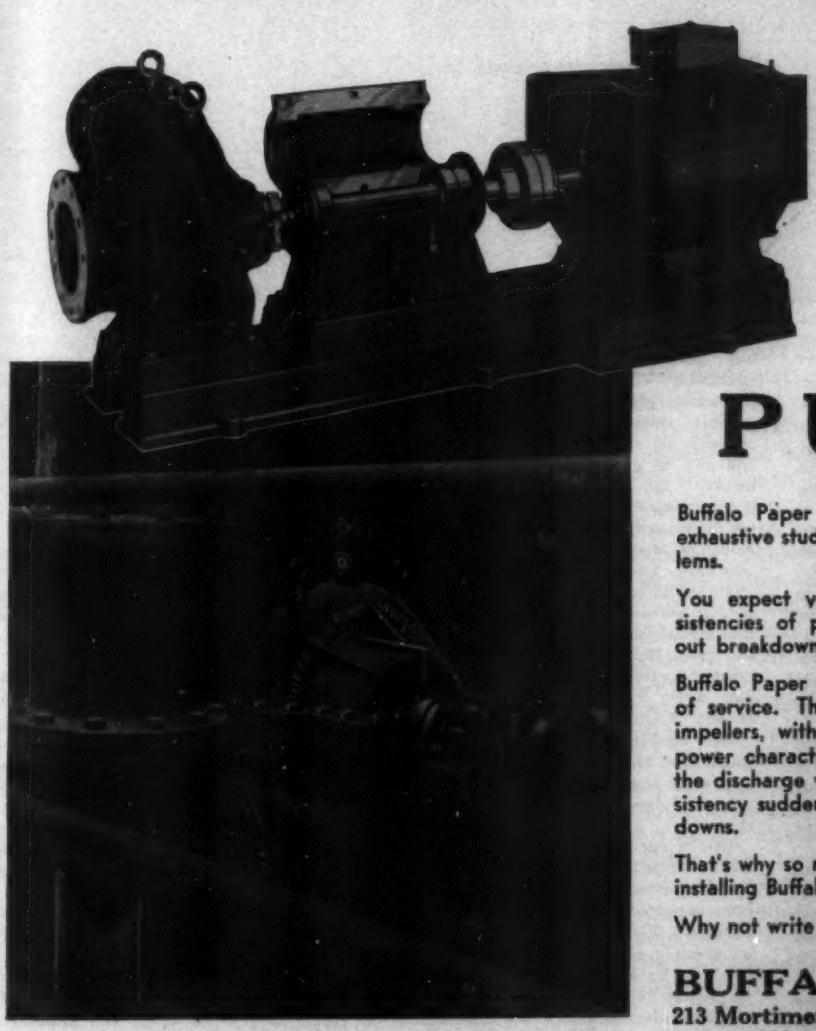
Some machine operators consider the maintenance man as a necessary evil. This may be the maintenance man's fault for not trying to gain the confidence of the different superintendents, tour bosses and machine tenders, so that they will cooperate with him for their mutual good. Some illustrations of what the operator can, and sometimes does do, to give the maintenance man a break are as follows: Notify him about an anticipated shut-down to change felts, wire, wash-up, etc. There may be a motor control contact that is bad and that he has been hoping against hope he will get a chance to repair before it causes a shut-down.

A maintenance man's pet peeve, especially an electrician's, is to get a phone call to come to some machine or department, usually at the other end of the mill, without being told what has happened. Another pet peeve is the reluctance of the

If You Want HIGH CONSISTENCY PUMPS *that won't Overload . . .*

Buffalo Diagonally Split Shell Single Suction Pump with bearing cover lifted.

INSTALL



"Buffalo"

PAPER STOCK PUMPS

Buffalo Paper Stock Pumps are the result of an exhaustive study of paper mill liquid-handling problems.

You expect your pumps to handle varying consistencies of paper stock without clogging—without breakdown.

Buffalo Paper Stock Pumps are built for that kind of service. They are equipped with non-clogging impellers, with the Buffalo non-overloading horsepower characteristic. You can operate them with the discharge valve wide open, or change the consistency suddenly without fear of trouble or breakdowns.

That's why so many paper and pulp mills are today installing Buffalo Paper Stock Pumps.

Why not write today for Bulletin 953-D.

Buffalo No. 10 Double Suction Pump handling 2000 gpm. of 4% Sulphite Stock against 87' head.

BUFFALO PUMPS, INC.
213 Mortimer St. Buffalo, N. Y.
Branch Engineering Offices in Principal Cities
In Canada: Canada Pumps, Ltd., Kitchener, Ont.

"Buffalo" PUMPS
used where Performance Counts

machine help to clean everything in any other way than by giving it a good soaking with a water hose with plenty of pressure back of it. This has a very depressing effect on any motors, starters, switches, etc. that aren't waterproof.

The head of the maintenance department must be a man who has had considerable experience with power generating equipment of all kinds. He must know something about chemistry. He must know something about every type of mechanical contrivance. Above all, he must have fundamental training in the old circus adage, "The show must go on," because it is his task to see that the several parts of the mill keep running in order that the sales department may make good on its promises.

He must train his men to see with his eyes because it is physically impossible to be everywhere at the same time.

In my own mind, I would divide the mechanical work of keeping a paper mill moving in two parts—maintenance and repairs. Under maintenance I would have certain men in the operating crew, whose duty it is to oil and grease the machinery, pack pumps, put on belts, change rolls, examine the external parts of machines for the determination of wear; in fact, most of the work that does not require parts to be made in the shop, fine adjustments, or the putting together of a new part or machine for the first time.

The maintenance of a paper machine and its auxiliary equipment involves varied problems in all phases of the engineering field. Difficulties and complications rest in (a) determining existing defects and possible breaks so as to spot a failure before it occurs and causes a shut-down, (b) determining true cause and source of trouble or failure, (c) making repairs to machines and equipment while operating, (d) estimating time required to complete a shut-down repair job, and (e) training mechanics to recognize the importance of items under a, b, c, and d.

In training mechanics, an effort should be made to teach them to seek the source of trouble by process of elimination rather than by trial and error. In making repairs to a running machine, the first thought in the mechanic's mind must be safety.

In the matter of belting we have found it advisable to purchase belts to specifications and lengths to fit the individual drives, rather than keep a roll of belting in the storeroom and cutting off the required number of feet.

Several years ago we began a practice of installing anti-friction bearings whenever possible and we have found not only a saving in power, but less repair cost, less lubrication, greater convenience in applying lubricant, and greater improvement in cleanliness.

With reference to motors, it has been our recent practice to buy only splash-proof motors with anti-friction bearings.

In the maintenance of floors, I have tried several different kinds of floor hardeners, about as many kinds of steel mesh reinforcements, and in despair tried rubber tires on our trucks—this I found to be the answer.

In the matter of paint we have again experimented with many products and have just about decided to confine our uses to red lead and aluminum.

It is a great help to keep a card index of all motors, pumps, and similar machinery on which is kept full name plate data, so that when a part wears out, it is not necessary to try to read a badly corroded name plate. If it is possible to do so, and I think it is in most cases, a schedule should be made and followed whereby every machine that can be opened up, is opened up at regular intervals for examination and if parts begin to wear, spare parts can be on hand by the time a failure occurs.

Some of you may have expected that I would tell you how to keep a paper mill from shutting down—I do not know how.

Recent Improvements in Paper Machines —A Symposium

C. E. MACKLEM

Beloit Iron Works, Beloit, Wis.

Our shop engineering department has a great deal to do with improving the machinery which we manufacture. It not only takes care of our shop maintenance, but is also responsible for the replacement of our machine tools at the proper time to keep abreast of the latest developments in high speed accuracy and new methods of machining. The modern high speed, high production paper machine would not be possible without its advances in methods of balancing rolls, in providing machines and men to give us the close work now necessary on journals and bearings, and the finishing and grinding of rolls, dryers and other parts. In addition, the shop engineering department together with our laboratory works out more suitable metal mixtures, provides men and proper facilities so that we may use welded steel construction instead of cast iron where it is proper and takes care of similar duties. It also assists in conducting experiments on bearings, steam fittings and other small parts of new design.

Our other engineering department, the production engineering department, must find ways and means of obtaining results demanded by our customers in their machines.

One of our recent developments has been the new type quick removable fourdrinier. Another of our fourdrinier parts which has been improved recently is the suction box oscillator. The present day oscillator eliminates many small parts by supporting the boxes on springs. It has a roller bearing oscillating cam arrangement and is arranged so that the boxes, when planed off, can be replaced easily and automatically lined up with the wire.

A radical change has been made on our chain drive for dryers during this past year. In the new design, we build the chain case and dryer frame together, that is, the chain case is really the back side dryer frame, the sprockets are next to the dryers with bearings on the outside and very accessible.

We now use very few weight lever devices—most of the weight applying and lifting of rolls being done with calibrated springs with enclosed screws and gears and provided with gauges. For some purposes, oil, water and air cylinders have worked in well.

Other interesting minor developments have been such things as improved table roll bearings, use of new materials generally throughout the wet end—Monel metal and stainless steel being used more and more, use of Micarta for spring mountings and supports around wet end, and use of needle bearings and small roller bearings for many purposes on the machine.

There also have been many mechanical improvements recently in the suction rolls which we manufacture.

The Beloit Dual press, perhaps has been one of the most outstanding developments. Among the features of this press which interest the plant engineer are: simplicity as compared to old press arrangements, use of three main rolls instead of six to obtain same dryness, comparatively few felt rolls required, and elimination of several vibrating doctors. These same advantages apply to the suction drum press, which is fairly recent in application.

While the enclosed gear units are not new, there have been improvements to these mainly in connection with the lubrication and the clutches. Another recent addition to our equipment is a high speed reel, now operating very successfully on board. Our winders also have been receiving a good deal of attention recently and especially those for new high speed board machines. Three hundred and fifty tons a day from a machine means heavy and substantial well built machines.

S. A. STAEGE

Black-Clawson Co., Hamilton, Ohio

We now have a new cylindrically-shaped vertical screen, having a high frequency oscillating pumping action, but without rotating parts except an eccentric shaft. This screen has not yet been placed on the market. It is now going through trial tests.

In this screen, the plates are arranged vertically so that all dirt, heavy fibers, etc. tend to fall to the bottom of the screen and do not accumulate to fill up the slots or to work their way through the screen. The screen also is arranged to discharge the screened stock below the stock level, that is, it has a submerged orifice discharge.

This vertical screen has a cylindrical oscillating diaphragm member which operates at high speed and short stroke.

Our new flow box and slice, of which several installations have been made recently, is all of metal construction and is lined with stainless material throughout. All flow curves are of easy radius and designed to prevent eddies and undesirable hydraulic disturbances. At the same time, incorporated in the design are means for producing a very uniform flow and equal velocity across the entire width of the machine.

Our oscillating rectifier, now in commercial use, has been applied to both fourdrinier and cylinder machines. In the case of fourdrinier machines, it is located in the flow box as closely as possible to the slice discharge; in cylinder machines with Black-Clawson Uni-flow vats, on the approach side of the mold.

The oscillating rectifier is designed to operate with strokes from perhaps as low as 1/64 in. up to ⅛ in. or more and with frequencies at the longer stroke of perhaps

THIS WRIGHT IMPROVED HOIST...

HAS 21 POINTS of SUPERIORITY

● Wright Improved High Speed Hoists have 21 distinct points of superiority. Just for example: that zinc coating (exclusive with Wright) defies corrosion under any atmospheric condition. And the load chain safety guard prevents the chain from riding out of pocket regardless of hoist position. It has speed; ease of operation; grease-sealed ball bearings . . . A rugged, non-slipping, non-fouling hoist which will give you the speed, strength and durability you want. Send for complete Wright Hoist catalog.

WRIGHT MANUFACTURING DIVISION
AMERICAN CHAIN & CABLE COMPANY, INC.
YORK, PENNSYLVANIA

In Business for Your Safety

ACCO

WRIGHT *Improved High Speed* HOISTS

ROLLS OF PAPER CAN'T JAR LOOSE!

When freight cars hit at from 5 to 12 miles an hour, the impact is considered rough handling. Yet these rolls of paper stay piled and secure, delivered as they were loaded at the mill.

Stanley Car Banding follows the curves of the rolls thus distributing the pressure. Holds them in a "floating load" that shifts slightly as a unit to absorb even heavy shocks. Banding for any shipment, compared with wood bracing, reduces damage claims substantially, according to the Freight and Claims Division of the Association of American Railroads.

Stanley Car Banding is cheaper, too. In some instances it cuts labor for bracing by as much as 75%; materials by as much as $30 per car; dunnage by as much as 1400 pounds per car.

You get them all . . . quicker starts for your shipments . . . improved service to your customers . . . better protection for your goods, with the complete equipment described in the new Stanley Car Banding catalog. Write for it today! Stanley engineers will be glad to design a safe, economical load for you without obligation. The Stanley Works, Steel Strapping Division, 167 Lake St., New Britain, Connecticut.

Stanley Type "K" Car Band Sealer

Stanley Type "G" Car Band Tightener

Stanley Electric Car Banding Tool

STANLEY

CAR BANDING SYSTEM

400 to 500 or more at the shorter stroke up to possibly 1500 strokes per minute or even more if desired. Its blades or vanes are mounted vertically edgewise on a horizontal plate which at that location forms the floor or bottom of the streamlined flow box and slice.

The use of the oscillating rectifier has been found to greatly improve the formation of the sheet and makes possible considerable increase in speed with a more even sheet and better formation.

Finally but perhaps not least in importance is our slotted forming table. This forming table retards drainage to permit better positioning of the fibers before setting. Its close approach to the breast roll prevents the sag in the wire occurring with the greater span from table roll to breast roll; and the rigidity and stiffness of the forming table avoids the sag or unevenness found in the old style forming board or with table rolls next to the breast roll. The slots in the forming table also permit some degree of drainage but not too much. The angle of the slots to the horizontal causes a scooping action and removal of water from the bottom of the wire, and effectively prevents water from being thrown up against the wire and sheet as is the case with table rolls next to the breast roll.

O. C. CORDES, Sales Engineer Downingtown Mfg. Co., Downingtown, Pa.

This paper is being confined primarily to the wet end of the cylinder machine.

The vat is the most important part of the cylinder machine, for it is here that the sheet is formed and the quality of the utlimate product determined.

Our company is today carrying on a series of tests in a special full size vat to determine how, when and where the sheet forms and the surrounding conditions. These tests also are being conducted to study the effect of the rectifiers used in the Downingtown-Puette vat.

The next real problem was to properly handle the wet sheet as it came from the vats and passed through the primary presses and first press sections. In order to make this machine safe running, the extractor unit was developed (consisting of a substantially constructed wire faced roll with a rubber covered top roll) and installed right after the last vat. Here the sheet on the underside of the felt, as it comes from the vat, is passed over the wire surface and water is removed by pressure of the top roll without injuring the formation of the sheet, and at the same time setting the fibers, so the sheet can be handled safely in subsequent pressing operations. This unit made the machine safe running so that production was increased from 10 to 20 per cent and quality naturally improved.

The next step was to reduce the number of primary presses and nips, and, at the same time, remove water more efficiently with less loss in bulk, and an increase in felt life. This has been accomplished by removing three or four primary presses and replacing these with a rubber covered suction primary press and in most cases returning the top felt from the top roll of this press. A still greater improvement has been obtained by replacing the balance of the primary presses with a second primary press and the installation of suction rolls in the main press sections. The number of suction rolls used and their position is determined largely by the product to be made and the speed of production.

In order to improve felt life and keep felts in better condition, the suction felt roll was developed. This roll has a perforated bronze shell mounted on ball bearings and is turned by the felt with negligible effort. The installation of this roll in various locations on machines making all types of paper improved felt life from 20 to 50 per cent and eliminated costly shut-downs for wash-ups on the press sections.

We have developed a very successful top press roll drive which operates on the adjustable speed principle, i. e., the bottom roll of the press is driven directly from the floor drive and the top roll is driven from the bottom roll through a totally enclosed positive drive type adjustable speed unit having infinite steps through its speed range. A good many of these drives are in successful operation and are giving an improved quality to the sheet finish and an improvement in felt condition and life.

We are now working on the development of a suction extractor unit, with the elimination of the top felt entirely as our objective.

The Downingtown wall board forming and pressing machine combines well established paper machine elements with some new principles into a unit of great flexibility and versatility. Formation, the sheet being formed upon a flat wire, may be effected by natural drainage only or the drainage may be assisted by vacuum. The primary press section is unique in that all top primary rolls are mounted on one pair of full floating adjustable arms with the bottom roll surfaces common to one tangent. From the primary press section, the sheet is carried through the main presses and delivered to the dryer without the formation having been disturbed from the breast roll to the last press.

In commercial practice, the machine excels in uniformity of product, absence of seconds, minimum moisture content leaving the last press, ease of operation, economy of power consumption, extreme flexibility, and accessibility of all operating parts.

The Downingtown asbestos cement machine is of the Hatschek type in which all of the mechanical details are brought to a high degree of perfection and the vats so proportioned that a minimum of trouble is experienced with formation. The felt is cleaned by a suction felt cleaning roll and the main suction box ahead of the making roll is replaced by a specially designed suction roll. These two rolls greatly increase felt life.

SAMUEL M. BRATTON, Chief Engineer Pusey and Jones Corp., Wilmington, Del.

Today, due to increased handling facilities for exceptionally heavy pieces of equipment, better materials, and the ability to machine parts to almost absolute accuracy, it is possible to make paper machines capable of producing paper at almost 2,000 feet per minute and more than 300 inches wide.

Minor changes are being made constantly in parts of the machine which insure longer life, less maintenance, more production and better quality.

All-metal head boxes are being used—some are lined with a non-corrosive material, others are made from steel plate clad with a non-corrosive sheet of stainless steel or copper. Slices are now provided with many more adjustments. Suction boxes are being equipped with vibrating mechanisms which will give both a crosswise and lengthwise movement at the same time. Wire carrying rolls on the larger machines are being made of steel tube with a Monel covering welded in place.

The type of shake heads and combinations and length of strokes that can be applied to various sections of shake rails makes it possible to produce a shaking table to suit the most exacting requirements.

Pneumatic loading for upper press rolls is now being used, and with the use of recording devices, an accurate record can be kept of the amount of pressure at which the paper is pressed.

Automatic electric felt tighteners are now used on dryer felts, and they also can be used on press felts, if desired, eliminating all sheaves, chains, weights, etc., that have been used in the past for applying tension to the felts.

For a machine having an all-gear drive on the dryers, a method has been developed for cutting the gears to a very close tolerance and by using metals of very fine texture, we are now able to produce gears that are almost noiseless, and wear reduced to a minimum. There also has been developed a chain drive for driving the upper dryer from the idler between the lower dryer gears and, by the use of this method, any desired space between the upper and lower dryers may be obtained.

Steam joints are of the pressure sealing, non-lubricating type. The back side of the dry part of an up-to-date paper machine is just as clean as the front or tending side.

To eliminate the loss of time formerly experienced on the standard Pope reel, after the starting drum has been put in the winding position, the bearing support is now provided with a loose jaw, in order that it may be returned to starting point and a new reel of paper started immediately. New unwinder frictions have been designed, either air or water cooled, with the controls located at a convenient place near the winder, where tension may be applied or released by the turning of a small handwheel which has been termed by some operators as "finger tip control."

Drives have been improved extensively with the use of accurate gears of bevel and hypoid type. Electric clutches, improved high speed mechanical clutches and electric belt shifters, which are controlled from the operating side of the machine, have greatly improved this part of the machine; and a type of oil seal has been developed whereby the seal can be renewed very easily and it is no longer necessary to remove large antifriction bearings, lug clutches, etc., to renew oil seals.

Changes are being made constantly, and it is the wish of the machine builders that this be continued or even accelerated, and to do this, they need the help and suggestions of all those concerned in handling their equipment.

WASTE ◆ ◆ ◆ ◆ ◆ ◆ ? in YOUR mill

SCREEN PLATES show no wear after two years' operation. Nothing adheres to their smooth, polished surfaces. Fine slots improve paper quality without slowing up production. Slots do not clog and precision of slot dimensions is permanently maintained.

SUCTION BOX COVERS reduce wear of expensive wires and felts as much as 50%. Decreased friction, increased suction efficiency, lower operating costs—all result from use of patented CRODON-plated covers.

PRESS ROLLS are given a hard, smooth surface which prevents adherence of pulp and makes for easy cleaning, long life without regrinding, and low maintenance cost.

CRODON
The Chrome Plate

Many of the problems that confront operating departments can be answered in a single word—CRODON. There is no place in modern mills for production waste of whatever nature. New high standards demand elimination of unnecessary costs.

Chromium plate has demonstrated its adaptibility. Its wide utilization is evidence of remarkable economies and trouble-free operation. It has the added recommendation of substantial repeat orders from the most progressive mills.

CRODON not only prolongs useful life . . . it maintains new-equipment performance for extended periods, thus furthering economical and trouble-free production.

Our bulletins describing the accomplishments of CRODON plate are interesting . . . your investigation of these potential savings should be decidedly worth while. Let us assist in your efforts to reduce costs and improve quality.

Chromium Corporation of America

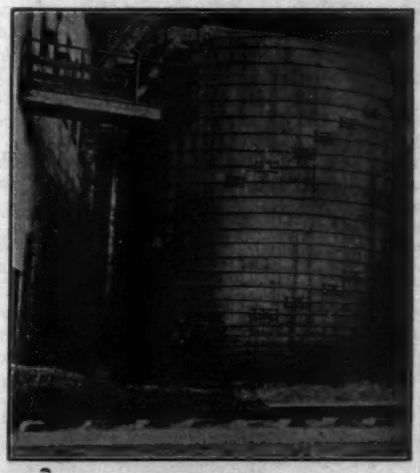
Executive Offices—120 Broadway, New York

P. O. Box 1546
Waterbury, Conn.

1760 Lakeview Road
Cleveland, Ohio

4645 West Chicago Ave.
Chicago, Ill.

Write **KALAMAZOO**
for
ACID
TANKS
and
BLOW
PITS



Acid storage tank at Nekoosa - Edward's Paper Co., Inc.

ANY SIZE, ANY STYLE

Tell Us Your Needs

We'll send blue prints and complete information

Let us show you the advantages of Kalamazoo Vitrified Glazed Tile for beater chests, beater dump chests, machine chests, and stock chests.

KALAMAZOO TANK AND SILO CO.
• KALAMAZOO, MICHIGAN •

TANKS - CHUTES - BINS

Of Stainless Steel Plate Steel Nickel and Monel Metal

MADE TO SPECIFICATIONS

If you need special metal construction work made to specifications, such as chutes, bins, breechings, agitator tanks, storage tanks, acid resisting tanks, vacuum tanks, chemical cut-off gates, chemical cookers, stacks, etc., we can handle the work. Littleford Bros. have for 54 years experimented with all types of metals, forming, welding and finishing it. Our engineers know what is needed for the job.

If it's nickel, stainless steel, monel metal, or any other metal you desire, we have it. We use the metal that applies to your particular need, heat resisting, abrasion resisting, or acid resisting. Estimates will be handled promptly, no matter how large or small a job may be—we will be glad to receive your specifications. Write today.

LITTLEFORD BROS.
426 E. PEARL ST., CINCINNATI, O.

G. A. PETERSON, Rice, Barton & Fales, Inc., Worcester, Mass.

We consider the McDonnell type of fourdrinier an outstanding development because it is not only a refinement of design, but is also a distinct departure from the orthodox type of fourdrinier.

The McDonnell type of fourdrinier allows the papermaker to utilize the whole forming area of the wire from the breast roll to the first suction box. This is accomplished by mounting the breast roll independently of the table roll rails, inserting between the breast roll and suction boxes another roll covered with soft rubber and also mounted independently of the rails, and shaking these two rolls only. These two rolls may be shaken in unison or individually, and it is common practice to shake them at 500 shakes per minute without difficulty. It also is possible to change stroke of either roll as desired, while running.

This type of fourdrinier is very versatile as a single machine equipped with the McDonnell fourdrinier can make almost any variety of paper.

It is in successful operation on news, book, litho, bible, cover, bond, waxing, glassine, and specialty papers.

Some of the benefits obtained by the use of the McDonnell fourdrinier are: better quality sheet at higher speeds; lengthened fiber in sheet without loss of formation; reduced beating time without affecting quality; reduced cost of furnish; greater pop test; reduced maintenance due to shaking only two comparatively light rolls instead of shaking the whole fourdrinier part; complete flexibility while running; and a shake which effectually moves the wire from breast roll to suction boxes.

Tissue Papermaking Machines

E. A. ELLIS, Sales Engineer
Downingtown Mfg. Co., Downingtown, Pa.

The fourdrinier machines used to manufacture cigarette, carbon and condenser tissues may be divided into three different types, as follows: (1) conventional type with pick-up felt, (2) modified type with suction couch roll, and (3) French type.

Figure 1* illustrates the conventional type with the pick-up felt. This machine is being used by the majority of mills.

The stock inlet is a combination of two slices. The first slice is adjustable vertically for controlling stock flow. The second slice has a flexible lip which allows operator to level sheet; it also is adjustable vertically. Both slices are adjustable endwise for deckle.

The wire is provided with a shake arrangement. The fourdrinier table is usually operated level. When cigarette paper is being made, a dandy roll is run on top of the wire.

The pick-up felt is reversed at the first press, where it is joined by the second press felt, which picks the sheet off the first press felt and passes same through the second press.

On this type of machine, the wire and press sections must be arranged so that they operate together, with individual adjustment between the driven sections.

**For diagrams of tissue papermaking machines, see pages 456 and 458.*

A machine of this type, capable of trimming 100 in., will produce approximately 8,000 pounds of 8½-pound cigarette tissue per day.

Figure 2 illustrates the modified type with the suction couch roll. The installation of the suction couch roll in place of the conventional plain couch is the only feature that differs from the fourdrinier section of Figure 1.

On this type of machine, each section is equipped with its own drive.

A machine of this type trimming 100 in. will produce approximately 12,000 pounds of 8½-pound cigarette tissue per day.

Figure 3 illustrates the French type machine. The usual fourdrinier section, as compared to the standard machine, differs only in the type of couch used. In this case, a wool jacketed top roll is used to couch the sheet off the wire.

The dryer section consists of five paper dryers and four felt dryers. They are equipped with four wool dryer felts and three dryer drives. This type of dryer section is typical of French design. Its purpose is to overcome cockling. By driving the dryers independently at several points, the operator is able to control them so as to take care of the varying shrinkage of the paper as it passes through the dryer section.

A machine of this type is designed to make quality paper at very slow speeds. It will produce approximately 7,000 pounds of cigarette tissue per day when trimming 100 inches.

The straight fourdrinier machines used to manufacture wet crepe tissues, such as toilet, towel and napkin, and straight tissues, such as wrapping and waxing, may be divided into two different types, as follows: (1) conventional type, and (2) Yankee type.

Figure 4 illustrates the conventional type. This machine is being used by the majority of mills.

The stock inlet is usually of the flexible lip type. On certain grades of paper, a shake is provided on speeds up to about 800 feet per minute. The first and second press rolls, top and bottom, may be plain rubber covered rolls, or bottom rolls may be of suction rolls with rubber covers. Mills using suction rolls have increased production, increased felt life, and eliminated pin holes and crushing. Mills manufacturing toilet, towel and napkin tissues at high speeds have found the arrangement as illustrated in Figure 4 to be the best. However, concerns making waxing, wrapping and such usually have but one press—either plain or suction.

The first paper dryer usually is designated as being a floating dryer, this dryer being driven independently from the other dryer. It also is provided with a separate dryer felt. With this arrangement, the amount of crepe that is put in the sheet is easily controlled.

A machine of this type is capable of producing the following results: (1) manufacture wrapping, waxing, fruit, napkin, table cloth, towel and toilet at basis weights from 8 pounds to 40 pounds; (2) speed varies between 450 and 1,000 feet per minute depending upon kind and quality of the paper; and (3) approximate production for a 100 inch trim machine is between 15 and 20 tons of paper per day.

Figure 5 illustrates the Yankee type and is used mainly to produce crepe tissues.

The wire and press sections on this machine are essentially the same as on the conventional type. In this case, the pick-up felt passes between the nip of the pressure roll and Yankee dryer.

A machine of this type, operating at 1,000 to 1,200 feet per minute and trimming 100 inches, will produce between 25 and 30 tons per day of 10 pound toilet tissue. It is capable of producing crepe towel at approximately 750 feet per minute.

There are two types of Yankee machines used to produce tissue products, such as dry crepe tissues and machine glazed tissues, and which may be designated as (1) cylinder type and (2) fourdrinier type.

Figure 6 illustrates the cylinder type machine. The wet end consists of a head box, a vat with cylinder mold, and a couch roll. The stock formed on the cylinder mold is removed by means of a pick-up felt with the aid of pressure exerted by a soft rubber couch roll. Some vats are arranged to operate under a vacuum. A machine of this type, trimming 70 inches, will produce approximately 6,000 pounds per day and operates at a speed of approximately 350 feet per minute.

Figure 7 illustrates the fourdrinier type Yankee machine, which is used to produce facial tissue, cellulose wadding, and machine glazed tissue. The wire section of this machine is essentially of the same design and construction as that used in the manufacture of tissue papers on high speed fourdrinier machines. The pick-up felt, which is a plate felt, retains the sheet after passing through the press section, carrying it to the Yankee dryer section, where the sheet leaves it and adheres to the dryer. The dryer section consists of one Yankee dryer and a rubber covered pressure roll. The sheet is removed from the dryer by means of a crepe doctor.

The Yankee dryer is driven direct from a motor through a silent chain drive. From the in-drive shaft, the press is driven by a belt and cone pulleys. The couch section is driven from the press in-drive shaft by means of cone pulleys and a belt.

The average machine of this type will produce facial tissue at about 800 feet per minute and cellulose wadding at 1,000 feet per minute. Some machines are operating at much higher speeds.

Figure 8 illustrates a modified type of the Yankee fourdrinier, which is used primarily to manufacture machine glazed tissues. Two press sections are used and they may be either suction or plain. The Yankee dryer is equipped with two pressure rolls instead of the usual one roll.

Figure 9 illustrates the Harper type fourdrinier. This machine is used in the manufacture of a wide range of tissue papers. However, it gradually is being discarded for the straight fourdrinier. This is due to the fact that the speed and production is limited by the couch section.

The design of the couch roll housing is a very important detail, as the sheet at the couch is crushed easily. Therefore, the housing is arranged for very delicate adjustment to permit a gradual variation of the pressure between the two rolls. The top couch roll, of light construction, is covered with very soft rubber.

INGENIOUS WAY TO FILL PAPER MILL WITH ORDERS

A Paper Mill manufacturing newsprint has an ingenious plan for filling their mill with orders in dull times as well as good times, which can be used to advantage by many Paper Mills.

This Paper Mill will use their Publishing Customers OVER-ISSUE papers, which will be brought to the mill in trucks that were formerly returning empty. These OVER-ISSUE papers will be De-inked to strong pulp, with valuable profit and good saving in Sulphite, and the pulp will be used with their regular furnish.

The Publishers like this arrangement, which is valuable to them, and which at the same time disposes of their OVER-ISSUE papers immediately with greater income (or with credit), and sometimes with saving in warehouse space. The Publishers are concerned about having to get so much paper from foreign mills, and would like to get their paper in the United States.

De-inking the OVER-ISSUE papers is a very ingenius way to fill the Paper Mill with orders in dull times as well as good times. It is an excellent lever in obtaining new customers in publishers now using foreign papers. Also it is good business, as it can be done with valuable profit by APMEW McGregor De-inking Process & System.

The PROFIT from De-inking OVER-ISSUE papers is figured for 20 tons daily at $36,000.00 a year and the saving in Sulphite at $20,400.00 a year, and this repays the investment the first half year and thereafter provides a valuable income.

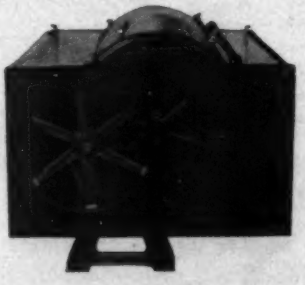
AMERICAN PAPER MACHINERY AND ENGINEERING WORKS, Inc., Glens Falls, N. Y.

The A. D. Wood Machine

PULP THICKENER — WASHER — SAVEALL and WATER SCREEN

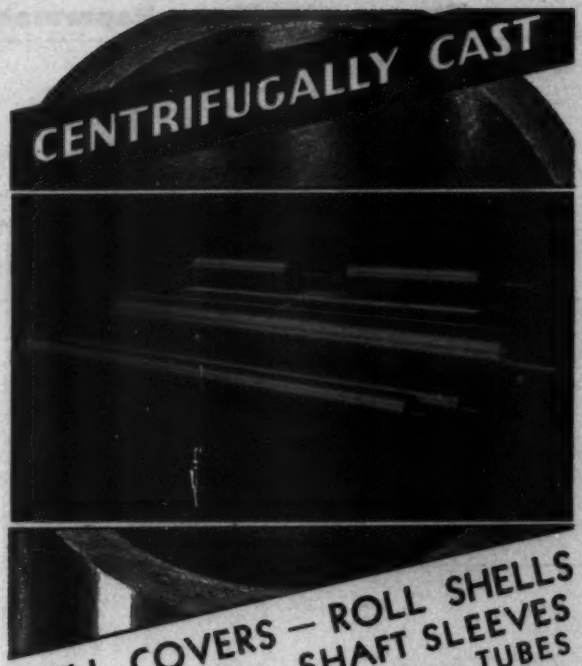
No Couch Roll or Doctor. Handles variable flows and consistencies. Equipped with patented Double Sealing Collars. Efficient, economical and practically automatic.

Over 30 installed in 1937.



GLENS FALLS MACHINE WORKS, Inc.
GLENS FALLS, N. Y.

Ask for descriptive Bulletin



ROLL COVERS — ROLL SHELLS
PUMP LINERS — SHAFT SLEEVES
BUSHINGS — CASTINGS — TUBES
BRONZE—IRON—MONEL—COPPER
3" to 46" Diameter — Any Length

by SANDUSKY

Industrial products—like men—are known by the friends they keep.

Sandusky Centrifugally Cast roll covers and roll shells have held the friendship of paper mill men for nearly 30 years.

Why?

Because Sandusky spun castings have superior qualities. They are hard, dense and sound throughout. They stay in shape. They are made to stand up under severe physical and chemical service.

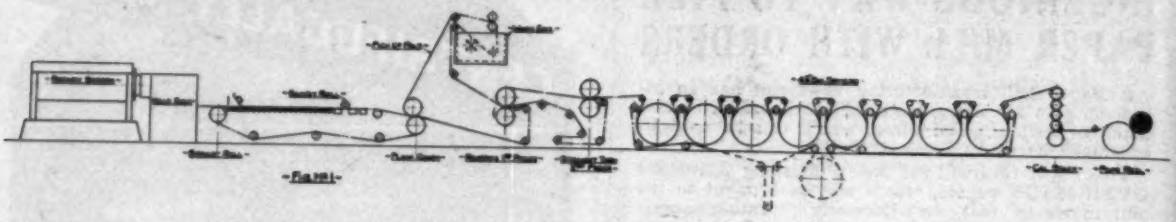
Your machine builder can supply Sandusky shells for your rolls. When you need rolls—Specify Sandusky Centrifugally Cast.

Write for Illustrated Bulletin No. 537

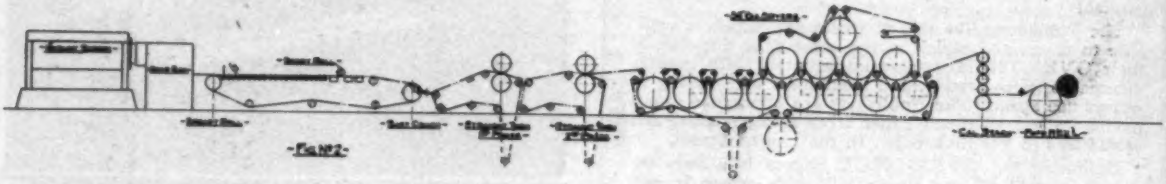
Sandusky Cast is PRESSURE CAST

Sandusky Foundry & Machine Company

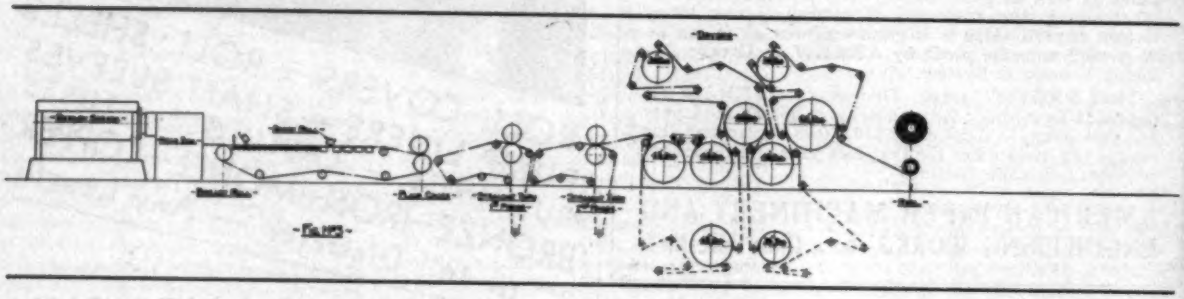
Diagrams of Tissue Papermaking Machines—See Page 454.



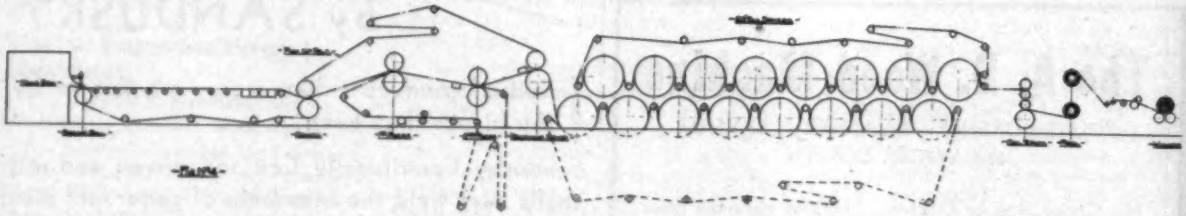
~Fig N°1~



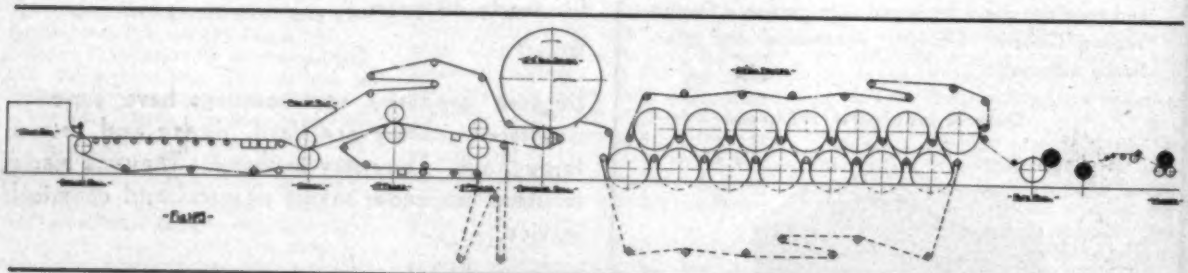
~Fig N°2~



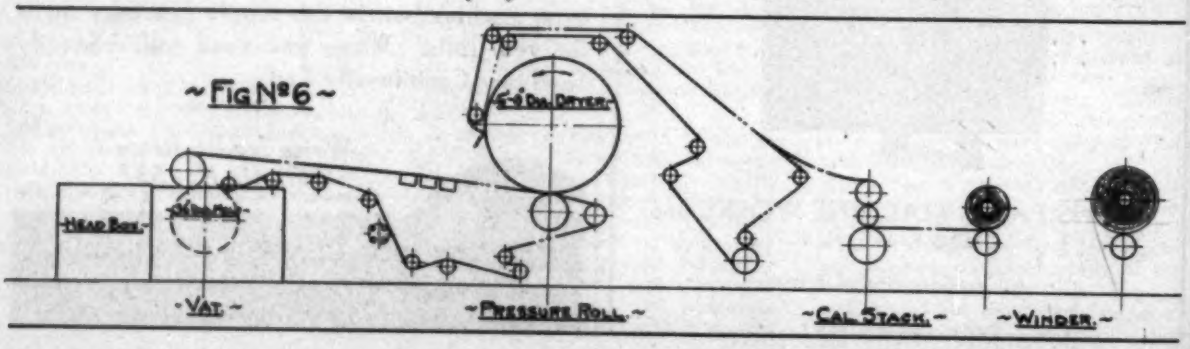
~Fig N°3~



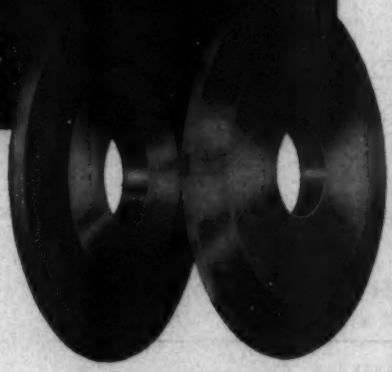
~Fig N°4~



~Fig N°5~



SLITTERS
FOR PAPER MILLS



Forged Cutting Edge

Hard and Tough

Let us quote on your cutters for Cameron machines. "Red Streak" Cutters give satisfaction and economy.

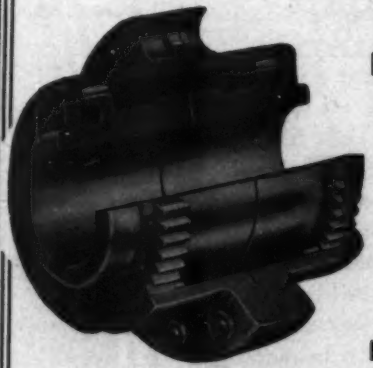
Simonds Saw and Steel Co.
FITCHBURG, MASS.

1350 Columbia Road
Boston, Mass.

127 S. Green St.
Chicago, Ill.

311 S. W. First Ave.
Portland, Ore.

POOLE
FLEXIBLE COUPLINGS



All Metal
Forged Steel
No Welded Parts

•

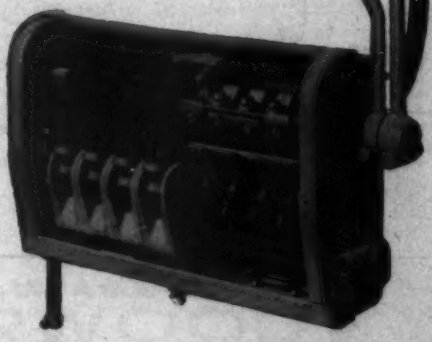
Oil Tight
Free End Float
Dust Proof
Fully Lubricated

Send for a copy of our Flexible Coupling Handbook

•

POOLE FOUNDRY & MACHINE CO.
BALTIMORE, MD.

ANOTHER YALE SCOOP!



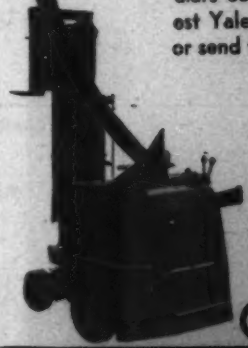
THE CAM-O-TACTOR

Once again Yale paces the field with a brand new Electric Truck engineering advance—Cam-O-Tactor Control.

Entirely different—this new type controller combines the high current interrupting capacities and long life of contactors with the positive action and safety of mechanical cam-operation. In addition it accomplishes the make and break contacts without creating the usual sticking or welding of electrical surfaces . . . EVEN WHEN UNDER EXTREME VIBRATION OR FLUCTUATION OF VOLTAGE!

And don't forget—ONLY Yale trucks can bring you these outstanding improvements because ONLY Yale trucks feature Cam-O-Tactor Control For further particulars contact the nearest Yale representative or send for Free Folder.

FREE FOLDER
Complete details on Cam-O-Tactor Control. You should know all about this very latest development. A Folder is yours without obligation. Just send for it.



-YALE-

THE YALE & TOWNE MFG. CO.
PHILADELPHIA DIVISION
PHILADELPHIA, PA., U. S. A.

Diagrams of Tissue Papermaking Machines—See Page 454.

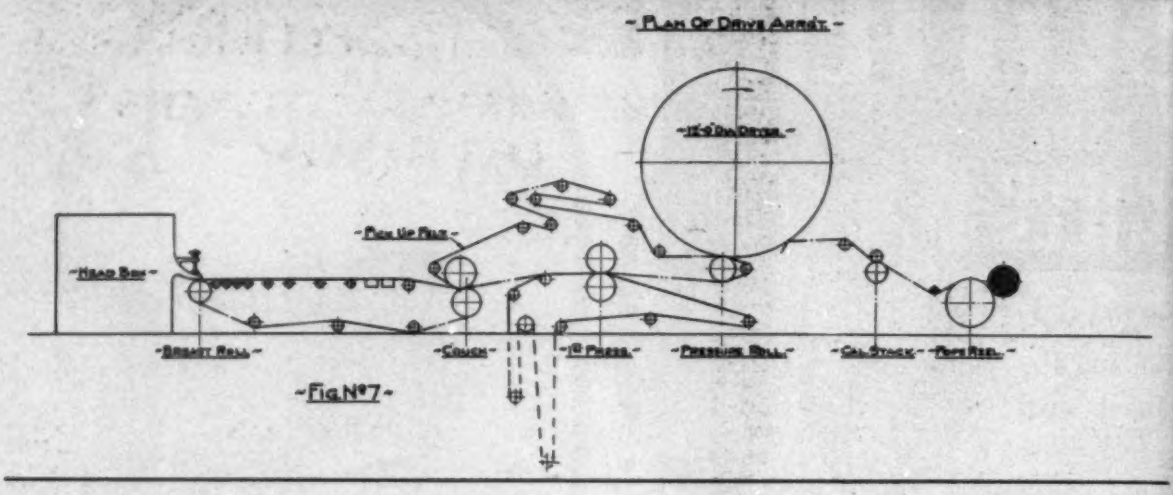


Fig. No 7

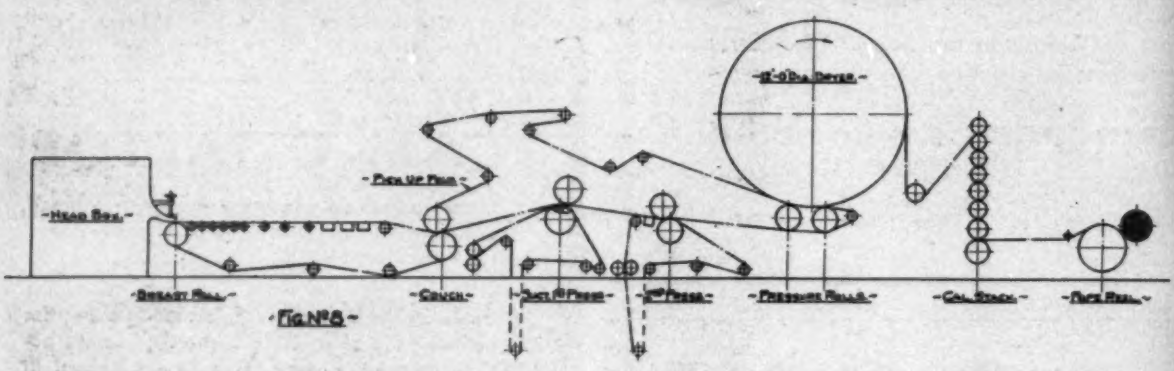


Fig. No 8

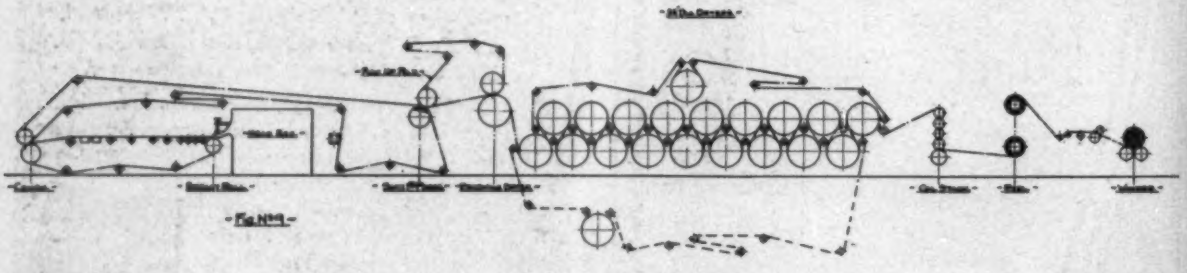


Fig. No 9

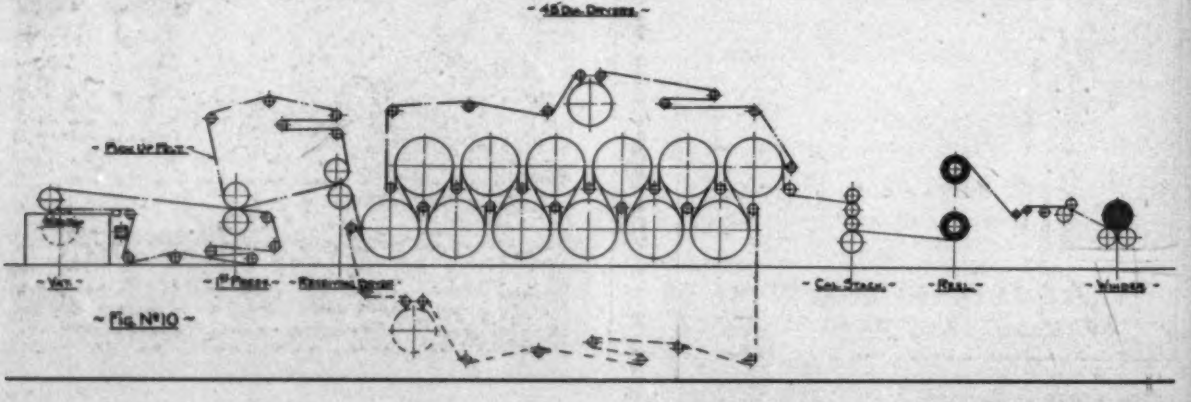
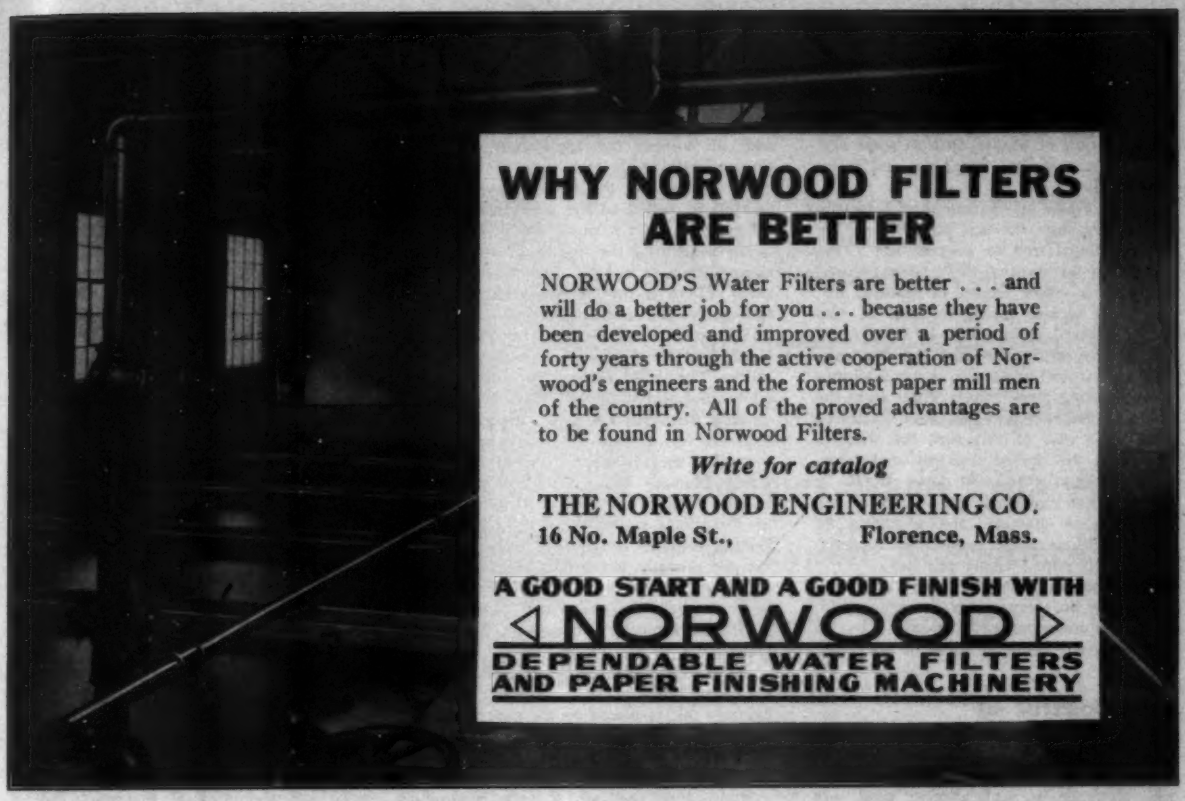


Fig. No 10



WHY NORWOOD FILTERS ARE BETTER

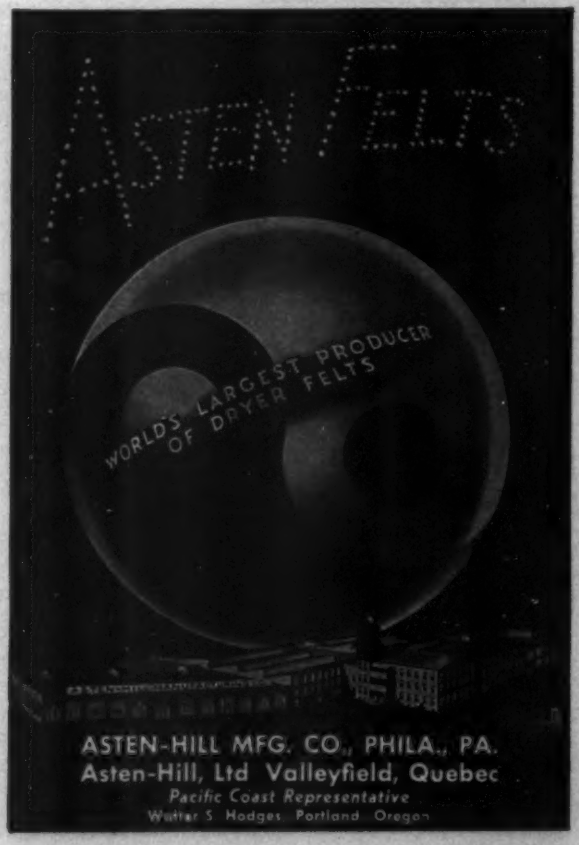
NORWOOD'S Water Filters are better . . . and will do a better job for you . . . because they have been developed and improved over a period of forty years through the active cooperation of Norwood's engineers and the foremost paper mill men of the country. All of the proved advantages are to be found in Norwood Filters.

Write for catalog

THE NORWOOD ENGINEERING CO.
16 No. Maple St., Florence, Mass.

A GOOD START AND A GOOD FINISH WITH
NORWOOD
DEPENDABLE WATER FILTERS
AND PAPER FINISHING MACHINERY

Wires THAT
TELEGRAPH
A LOT OF Research
• Research? It's always going on at Lindsay—has been for more than 30 years—behind the scenes and "behind the seams." There's a Lindsay wire for every need—with sewed, brazed or welded seam—each type prescribed to meet your exact case and to help you make better paper at a lower cost.
THE LINDSAY WIRE WEAVING CO.
14025 ASPINWALL AVENUE
CLEVELAND, OHIO
Lindsay WIRES


ASTEN FELTS
WORLD'S LARGEST PRODUCER OF DRYER FELTS
ASTEN-HILL MFG. CO., PHILA., PA.
Asten-Hill, Ltd Valleyfield, Quebec
Pacific Coast Representative
Walter S Hodges Portland Oregon

A machine of the Harper fourdrinier type, capable of trimming 84 inches, will produce approximately 10 tons of 12½ pound tissue.

Figure 10 illustrates the cylinder type tissue machine. It is used to manufacture a wide variety of tissues, such as crepe and plain toilet, twisting, wrapping, and many others.

After the pick-up felt and sheet leave the couch, they enter the first press, where the sheet is transferred to another felt. This felt carries the sheet to the receiving dryer, where it is either creped or skinned off. The press section usually consists of two rubber covered press rolls. In some cases, rubber covered suction press rolls are used with a great deal of success. Some machines manufacturing crepe tissues differ from the above in that the top press roll is chilled iron. In a case of this sort, the sheet is creped on the chilled iron roll and transferred by hand to the first paper dryers.

A machine equipped with twelve dryers, 48 inches in diameter and trimming 84 inches, will produce approximately seven tons of 10 pound tissue per day.

The machines, which have been described, by no means cover the entire field. There are many more variations in use to suit particular needs or ideas of operators.

The Control of Printing Quality in the Paper and Board Mill

DR. GERARD L. LAROCQUE, Pulp and Paper Div. of the Forest Products Laboratories, Montreal, Quebec.

Good printing requires at least two distinct sheet properties—printing-smoothness and ink-absorbency. Poor printing will result from lack of contact on minute depressions left by the wire or felt, or interstices between the fibers which are too deep to be filled by the film of ink. Alternately, tiny high spots on the surface may be subjected to excessive pressures which will squeeze some of the ink from the surface of the fibers at those points, causing minute blemishes on the print.

Softness can be measured by the Gurley-Hill softness tester. In combination with a test for smoothness, the softness test was found to be a distinct improvement over smoothness alone for the evaluation of printability. In the present instance, this softness tester was used in conjunction with a Bekk smoothness tester.

Optical methods, such as the Ingersoll Glarimeter and the Oxford Glossmeter, also are used for indicating the finish of paperboard and paper. They offer the advantage of being rapid and convenient to operate, but obviously they cannot be used for controlling printability when a definite correlation has been previously established with printing quality, and then only for that particular grade of paper.

The next step is to consider the drying of the film of printing ink after its transfer to the paper. The oil-absorbency of the paper is its most important property in the ink-drying operation and should, therefore, furnish a second criterion of printing quality.

In better classes of printing, vegetable "drying" oils are used as vehicles for the ink. Drying then takes place partly by penetration and partly by atmospheric oxidation. Another type of printing is that where a light volatile solvent is used for the ink vehicle, as in rotogravure, and the ink dries by evaporation of the vehicle, with or without the application of heat. Consequently, with each type of printing, it is essential that the drying properties of the ink be suited to the oil-absorbency of the paper in order to obtain the best results.

For measuring the oil-absorbency of the paper surface, a number of methods can be used. There is the oil-absorption test described by Wemhoff in which a drop of oil is placed upon sheet to be tested and spread out by means of a small gelatine roller. The time required for the film of oil to disappear is noted. There also is the oil-drop penetration test in which the time required for a drop of oil to penetrate through a sheet of paper is observed. Such a test obviously is not applicable to paperboard. A third method is that described by Grantham and Ure, who used a considerably smaller drop of oil than either of the two previous tests. A fourth one is the surface-oil resistance test, which was developed at the Pulp and Paper Division of the Forest Products Laboratories, Montreal, Quebec.

In this latter test, a thin film of oil, of the same order of thickness as a film of printing ink, is placed on the paper surface, and the time required for its disappearance is observed. A circular film of oil, ⅛ inch in diameter and 3/10,000 inch thick, is extruded from the tip of a specially ground glass capillary. On pressing this glass tip to the surface of the paper, the drop is transferred to the sheet and the time required for its disappearance is observed by means of a special illuminator. The mean time for ten such drops is taken to be the surface oil-resistance of the paper, and is recalculated to a standard temperature of 70 deg. Fahr. by means of suitable correction tables.

It is to be emphasized that it is not the absolute value of the oil-resistance that is usually important, but the uniformity in oil-resistance of a particular grade of paper.

A Printer's Paper Problems

OLLIE WATSON, Supt. Bridgen's Ltd. Toronto, Ontario

Consideration of paper for printing is dependent upon (1) the movement of the web or sheet of paper within the printing press, (2) the transfer of the ink, (3) the drying of the ink, and the various interactions between the paper and the ink which take place in the finished printed matter.

In printing from the roll, the paper must possess a certain minimum tensile strength in every part, and it must have sufficient power of stretching in order that the pull on the web may be distributed, as far as possible, across its entire width. The movement of the paper is appreciably more complicated when printing from sheets, and consequently the possibilities of trouble are considerably more numerous than in the case of printing from rolls.

Among the most common troubles is that of waviness of the paper. The change of dimension of the sheet of paper under the influence of moisture variations also can cause difficulties in the travel of the paper, even if they have not produced wave formation. A further difficulty in the travel of paper is its tendency to acquire and hold static electricity. Unless the temperatures of the paper, machine, and the pressroom are equal, static can be expected.

Smoothness is one of the most important properties of paper from the viewpoint of print transfer. The rougher the paper, the greater the printing pressure that must be used in order to secure an almost complete transfer, and at the same time the greater are the disturbing effects of such pressure. The offset process is very tolerant as regards the smoothness of paper. Unfortunately, however, the requirements of the offset process in regard to paper are very difficult to satisfy in other directions.

The offset process is particularly sensitive to papers whose surfaces are insufficiently closed, which difficulty is manifested by the separation of paper dust. The separated paper dust is transmitted by the rubber blanket to the zinc or aluminum plate where hygroscopic constituents affect the power of taking up ink of the printed portions of the plate, and this causes a gradual fading of the printed reproduction. The plate also can be affected by the presence of soluble alum in the paper.

A characteristic difficulty with the gravure process is caused by the abrasive constituents of the paper, or rather its filler. Hard constituents of the paper will scratch the polished surface of the cylinder, against which even chromium plating is an insufficient protection.

The speed of drying is a controlling factor for the rate of output, and consequently for the economy of production. It, therefore, is important to consider fully the controlling function of the paper, particularly its power of absorption. The scientific evaluation of the power of absorption of the paper can only be derived from the action of the printing ink, and from the use of the actual ink that is used in printing on the particular paper in question.

To produce colorful printing that will harmonize, you must prepare a good and suitable paper as a base. In reproductive color work, natural tone values are important.

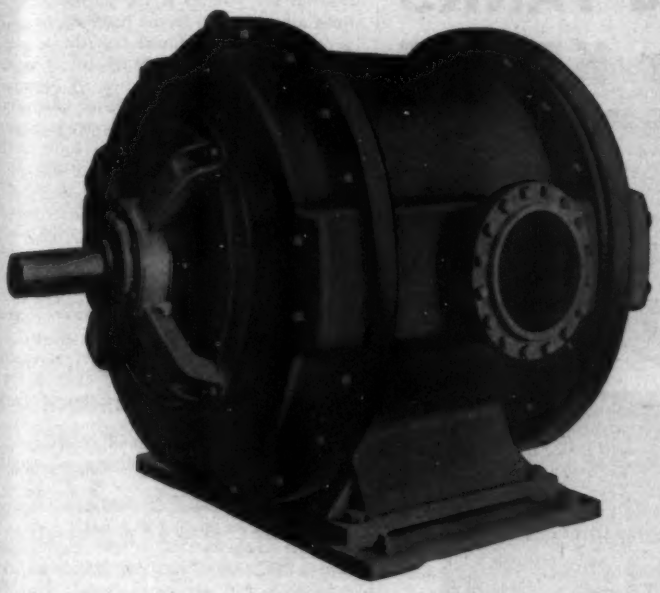
Ink rubbing on coated papers is one of our most common problems. Another new problem has been left on the doorstep of every color printer to nurse and fondle—and that is gloss ink. Specks on solids in printing on coated paper is another prevalent evil.

Dull, suede and semi-gloss papers are very troublesome in printing halftone reproductions. Two-sided stock in coated papers brings plenty of grief to the pressman. The smoothness and levelness of coated papers heavier than 80 pounds, invariably is unsatisfactory.

The papermaker should strongly advise a hard-sized coating where silver is going to be used. Papers coated with pyroxalin, metallics, velours, wax, foils, lacquers and cellulose acetate, and glassine and linen-coated papers, along with papers resembling vegetable or animal parchments, can be expected to have problems unique in nature and must have special consideration.

It is very important that the grain of all papers for letterpress and offset work

ONLY NASH VACUUM PUMPS HAVE ALL THESE FEATURES.



One Moving Element

Non-Pulsating Vacuum

No Internal Wearing Parts

No Internal Lubrication

Handles Liquid With Air

No Expert Attendance

Constant Efficiency

Low Maintenance Cost

THE NASH ENGINEERING COMPANY

SOUTH NORWALK, CONNECTICUT, U. S. A.

"You Can Take It For Granted"—

SOLVAY

Liquid Chlorine

IS *ALWAYS* STANDARD!

When a Company has maintained the most rigid of production standards over a period of 55 years . . . you can rely upon its name and on its products! Scientific methods . . . exacting supervision have made SOLVAY LIQUID CHLORINE a bleaching agent on which you can depend . . . that you can take for granted will be always pure, always uniform, when you receive it!

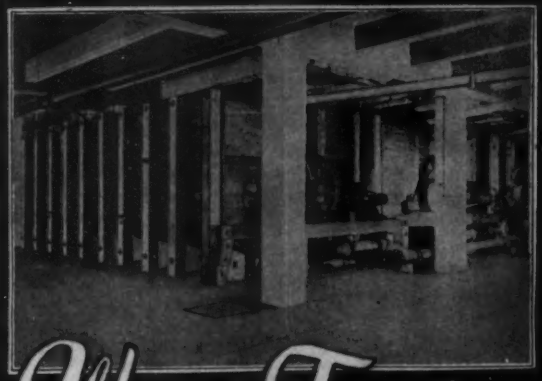
And when you place your order with Solvay for LIQUID CHLORINE . . . SODA ASH . . . CAUSTIC SODA . . . you are guaranteed fast, sure, on-time deliveries. You are relieved of worry, of check up . . . time spared for your own problems.

Write for full information and prices. Ask for free copy of 44-page book "SOLVAY LIQUID CHLORINE."

SOLVAY SALES CORPORATION

Alkalies and Chemical Products Manufactured by The Solvay Process Company

40 RECTOR STREET NEW YORK



Wood Tanks

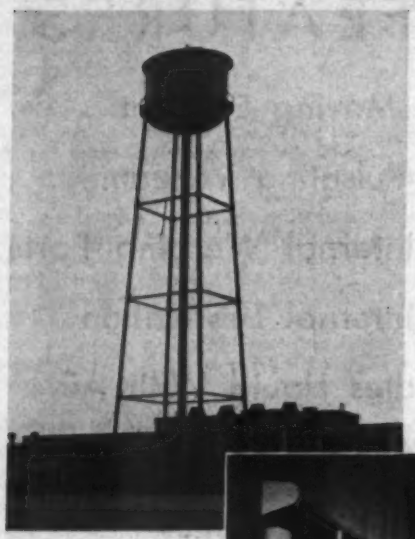
WHEN PAPER MILLS WANT THE BEST, THEY ALWAYS SPECIFY HAUSER-STANDER

Noted for Quality for 70 Years

THE HAUSER-STANDER TANK CO.

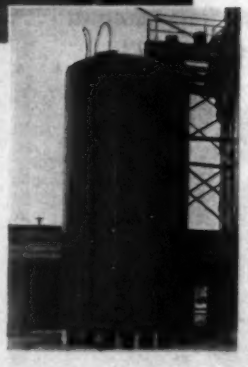
4812 Spring Grove Ave. Cincinnati, Ohio

STEEL PLATEWORK and TANKS for KRAFT CORPORATION at Fernandina, Florida



Above: 100,000-gal. elevated water tank at the Kraft mill, Fernandina, Fla.

Center: Interior view at Fernandina, showing some of the six welded diffusers installed there.



Above: 40,000-gal. hot water tank of welded steel construction.

THE new Kraft Corporation mill at Fernandina, Florida, offers a good example of the wide variety of steel platework and tanks being fabricated in our shops for the paper industry. Work fabricated for this mill included a 100,000-gal. elevated water tank for sprinkler service; 33 ft. by 13 ft. 6 in. flat bottom tanks for black liquor storage; welded digesters, 12 ft. by 45 ft., X-rayed and stress-relieved; six diffuser tanks, 4600 cu. ft. capacity, 14 ft. 6 in. by 33 ft. 4 in.; and a 40,000-gal. hot water tank, 15 ft. by 40 ft., all of which are of welded steel construction.

Our three fabricating plants are equipped to handle both field-erected and shop-assembled work, including welded pressure vessels built in accordance with paragraph U-68 of the A.S.M.E. Code for Unfired Pressure Vessels at Birmingham.

CHICAGO BRIDGE & IRON COMPANY

Cleveland.....2267 Rockefeller Bldg.
Birmingham.....1511 North Fiftieth Street
Tulsa.....1651 Hunt Bldg.
Houston.....2919 Main Street
Detroit.....1566 Lafayette Bldg.
Philadelphia.....1653-1700 Walnut Street Bldg.
Boston.....1562 Consolidated Gas Bldg.
Los Angeles.....1459 Wm. Fox Bldg.
Chicago.....2445 Old Colony Bldg.
New York.....3350-165 Broadway Bldg.
Dallas.....1446 Liberty Bank Bldg.
San Francisco.....1017 Rialto Bldg.

Plants at Birmingham, Chicago and Greenville, Pa.

should run the long way, or parallel with the cylinder. Registration of color work on the offset press is almost impossible when the grain of the paper runs the short way.

The National Bureau of Standards at Washington is responsible for the statement that cold weather may bring serious paper troubles for printers if the proper precautions are not taken in the handling of cold paper. It has been found that the average pile or case of cold paper will warm to room temperature at the rate of approximately 20 deg. Fahr. per 24 hours. Removal of the waterproofed covering from paper, while it is still colder than the air, will permit the edges to absorb moisture condensed from the atmosphere. This results in expansion of paper at the edges, which causes distortion, commonly known as wavy edges, and there is no method known for removing this form of distortion once it is formed.

In conclusion, I want to leave a few questions for consideration—

Is it possible to control weight of coated stock 38 in. by 50 in. 80 lb. basis? We find a variation per 1,000 sheets of from 306 lb. to 330 lb.

Are you aware that gloss coated paper for display work is becoming unpopular because of the glare?

What is the cause of foreign substances getting into the coating of paper?

What consideration is the papermaker giving for a substitute for cellulose from coniferous and deciduous trees? The demand for such cellulose to be used for other purposes than paper is becoming so great.

Will it be possible to make paper from glass? It is being made into curtains and rugs.

What development has been made in the lactic coatings for paper?

Formation of Paper

HARRY WILLIAMSON

Williamson Research Corp., New York

We must definitely know how to hydrate stock in order to obtain the desired characteristics in finished paper. The time-rate of formation expresses what takes place on the wet end of a machine. Formation of a sheet on a fourdrinier type machine is affected by the tube rolls and the shake device. The shake tends to prevent water from draining through the wire. Scrapers between the tube rolls scrape water from them. When we get to the suction boxes, the sheet is pinned by atmospheric pressure. The inherent curse of the fourdrinier type machine is slice velocity.

Shrinkage in width of sheet is greater when the shake is not running. Frequently there are more fibers in longitudinal direction on edge of sheet as contrasted with more uniform distribution of fibers in the center.

The slice medium is the only medium to control water and stock to the machine.

The fourdrinier has always produced better formation than the cylinder machine.

The cylinder machine depends upon difference in hydraulic head for formation. Its inherent curse is too sudden formation of sheet without control.

The more nearly that the stock is treated rightly, the more nearly paper will be supplied properly.

PAPER KNIFE GRINDING

● Recent emphasis on advances in knife grinding service by the Covel-Hanchett Co., pioneers in this field, refer to gains which are really outstanding and provide an actual higher quality of service besides speeding up the work and insuring an accuracy of finish not heretofore obtainable.

● The latest Covel-Hanchett full automatic traveling wheel grinder fully merits your investigation. Send for full catalogue description.

COVEL-HANCHETT CO., BIG RAPIDS, MICHIGAN, U. S. A.

ELIXMAN

CAPS

Straight wound paper cores made in sizes from 2" to 10" inside diameter with any thickness wall required.

Long draw protected slot caps of heavy gauge steel in all standard sizes.

Heavy duty caps with reenforced square hole. This patented feature of re-enforcement gives added strength and durability.

CORES

Samples of caps or cores will be gladly submitted.

ELIXMAN PAPER CORE COMPANY, Inc.
CORINTH, N. Y.

NEW EQUIPMENT AND SUPPLIES

Paper Machine Drainage System

Armstrong Machine Works, Three Rivers, Michigan, has announced the development of a drainage system for paper machine dryers which is designed to provide restricted blow through of condensate, air and steam.

In this system, exhaust or live steam, the dryer part being divided into three sections, is admitted to the dry end section through a main supply header. The drip line of each dryer of the section as well as of the second or middle section is equipped with an Armstrong Restrictor, a device which provides for rapid removal of condensate and air and for throttling or limiting the amount of dryer blow through. Condensate, air and blow through from the first section of dryers, after passing through the restrictors to a drip header, flow to a separator in which the air and blow through is separated from the condensate, the air and blow through passing to a supply header that connects with the second section of dryers, the condensate through a trap to the drip header of the second section.

The supply header of the second section also is connected with the supply header of

Note restrictions on drain lines from each dryer.

the first section through a differential valve which permits make up steam to be supplied directly from the first header to the second.

Condensate, air and blow through from the second section and flash steam from the condensate of the first section pass to another separator. At this point, hot condensate may be run to a hot well or pump and receiver unit, or, provided sufficient pressure is carried on the machine, may be piped to boiler feedwater heater.

Blow steam from the second section together with flash steam from the first section pass into a third header. This header, supplying the first few wet end dryers, the third section of the system, is connected with the header of the second section through a steam pressure regulator which permits the maintenance of a constant steam pressure within it. Also in this same header is an automatic air eliminator for exhausting accumulated air to the atmosphere.

Air and condensate from the wet end dryers of the section are evacuated through the use of Armstrong traps, one for each dryer and each designed for quickly venting large quantities of air. Condensate from these dryers may be handled in the same way as for the previous section, or, if low pressures are employed on the machine, it may be piped to a suitable vacuum pump.

In operation, the manufacturer states that after the differential valves and air eliminators are set, no further adjustments are required even though initial steam pressures are varied.

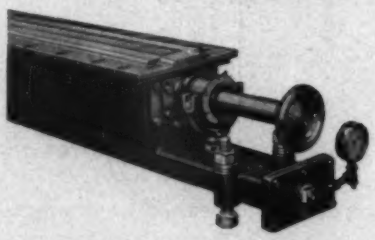
Self-Aligning Belt Idler

The Jeffrey Manufacturing Co., Columbus, Ohio, has announced a self-aligning belt idler which consists of a standard anti-friction idler, pivotally mounted on a supporting cross member, with a guide roll at each end. Each guide roll, in turn, is

mounted on a pivoted arm that extends at right angles to the idler on the side from which the belt approaches. A locking pin holds each arm in place. Merely by swinging the arms through 180 deg. and putting the lock pins in place on the opposite side positions the guides to train the belt when traveling in the reverse direction.

Encased Vacuum Roll

An encased vacuum roll, known as the Nash encased vacuum roll, has been announced by William C. Nash & Sons, Neenah, Wisconsin. Spider rings, reinforced with rods, make up the foundation for a spiral roll winding and a 14-mesh wire cloth covering; while the box contains a vacuum chamber and four water discharge outlets, two on either end. Anti-friction bearings, located outside the box and mounted on adjustable saddle yokes, support the roll. The back journal of the



roll extends beyond its respective bearing to permit driving of the roll. Vat ends are sealed with packing bushings. Both the roll and box, with the exception of the box cover, are of bronze construction, cast bronze being used for the box, while Johns-Manville No. 50 Eel-Slip material is used for the box cover. The cover is of the slotted type and allows the face of the roll to protrude. The manufacturer states that the roll will help in eliminating water streaks and two-sidedness; that it will increase the life of felts; that it can be used ahead of the breast roll for fresh water removal or following the breast roll in the position of a forming table; and that it may be coupled with a shower for felt cleaning. When used on felts, the wire cloth covering is eliminated, the roll winding serving as a felt spreader.

Speed Changer

The Texrope Division, Allis-Chalmers Manufacturing Company, Milwaukee, Wisconsin, has announced a totally enclosed speed changer unit which utilizes the principle of that company's Vari-Pitch sheaves. The unit, known as the Vari-Pitch speed

changer, is designed with double shaft extension and is provided with hand wheel control. It can be equipped for electric remote control, if desired, and manual remote control also is possible. Capacities now being offered include ratings up to 33 hp. with ratios as high at 3¾ to 1.

New Roller Conveyor Line

Palmer-Bee Co., Detroit, Mich., has placed a new line of roller conveyors on the market. The diameter range of the rollers is from 1 in. to 7⅜ in.; the capacity range, from 60 to 12,000 lb. Frame rails may be of angle, channel, or flat bar construction. Bearings are either ball or tapered roller; and may be had dry, grease-packed or fitted with lubrication fittings for pressure grease gun. The line includes both gravity and power driven units.

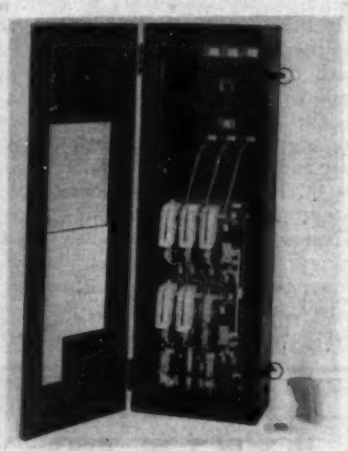
Industrial Curtain Wall

An insulated industrial curtain wall for steel factory buildings has been announced by Johns-Manville, 22 East 40th St., New York, N. Y. This wall is made up largely of units of encased insulating board (1 in. of insulating board with a ⅛ in. veneer of asbestos Flexboard or flat Transite) and corrugated Transite, the encased insulating board, being on the inside, the corrugated

Transite on the outside. The encased insulating board, according to laboratory tests, is stated by the manufacturer to afford the same insulating value as a 14 in. thickness of common brick, and yet weighs one-twentieth as much. Cadmium plated bolts hold the encased insulating board against the steel framework of a building. No expansion joints are necessary. A gray caulking compound is applied to the edge of each sheet. Painting of such a wall is not required; but it may be painted readily, if desired, after giving it a priming coat of boiled linseed oil.

Magnetic Reversing Switches with Air Circuit Breakers

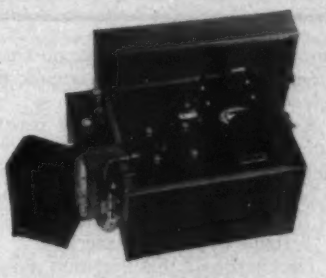
A new line of reversing magnetic switches which employ air circuit breakers has been developed by the Industrial Department of the General Electric Co., Schenectady, N. Y.



This line, designed as alternative equipment for fused motor-circuit switches, is intended primarily for the full-voltage starting of a.c. motors. A complete device consists of an air circuit breaker, two magnetic contactors mechanically interlocked, and a temperature overload relay, all enclosed in a sheet-metal case for wall mounting. The enclosing case is designed to permit operation of the air circuit breaker while the cover is shut. Likewise, the breaker, after it has tripped on short circuit, can be readily reclosed.

Portable pH Indicator

A portable pH indicator that reads directly in pH with glass, quinhydrone, hydrogen or any other electrode following the Nernst equation has been announced by Leeds & Northrup Company, 4934 Stenton Avenue, Philadelphia, Pa. When used with the glass or quinhydrone electrode, a temperature compensator adapts the entire pH scale to the temperature for which it is set. With the hydrogen electrode, the instrument is direct reading if the sample measured and the buffer solution are at the same temperature. The instrument also is used in oxidation-reduction potential measurements and in current and resistance determinations since it is equipped with a voltage scale as well as the pH scale. It can be used with external circuits of much higher resistance than the 100 to 300 megohms of its glass electrode. Other features, pointed out by the manufacturer, include: Quartz insulation, where necessary, to avoid leakage errors; a separate battery compartment to prevent corrosion; unimpaired accuracy in atmospheres of up to 95 per cent relative humidity; and the ability to make sodium corrections, where necessary, directly in pH units.

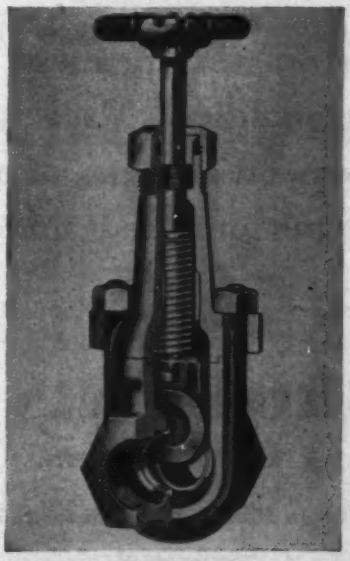


Paper Plasticizer

A straw colored viscous liquid, made from vegetable raw materials and known as Yumidol, has been announced by Glyco Products Co., Inc., 148 Lafayette St., New York, N. Y., as a softener and plasticizer for paper. This material is soluble in water, alcohol, methanol, glycols and glycerine, and most water soluble materials; and is insoluble in oils, fats, waxes, resins, and other water insoluble materials. It is non-inflammable and non-volatile; and does not produce acrolein or other acrid products, even on prolonged heating.

V-Bolt Gate Valve

A new design of V-bolt gate valve has been placed on the market by The Fairbanks Company, Binghamton, N. Y. Some of the features of the design include a body and bonnet of chrome-nickel alloy high-test iron or of semi-steel; a double-taper wedge with knife edge at bottom which cuts through heavy fluids or sediment; relief slots in threaded bonnet bushing that permit drainage back into body chamber; a ventilated malleable iron handwheel with rim surface above bronze nut and lock washer which hold it; and a V-bolt which locks the body and bonnet firmly together. The valve, made in sizes from ½ in. to 4 in., is for a working pressure up to 150 lb. steam or 225 lb. gas and liquid.

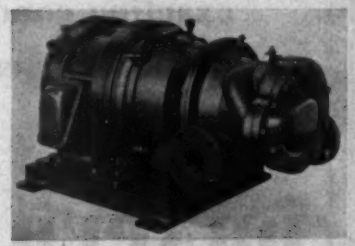


Pipe and Stud Extractor Set

A pipe and stud extractor set, consisting of 10 extractors and a rugged box for retaining them, has been announced by Reps Tool Co., Inc., 220 Delaware Ave., Buffalo, N. Y. The set is designed to fit every size and class of pipe (standard, heavy, and extra heavy) from ⅛ in. to 2 in., and every size of stud, screw and bolt from 1/16 in. to 3½ in. A patented four-point grip is claimed to prevent reaming and to assure a strong bite without hammering or pounding. Each extractor is of heat-treated forged steel with a Brinnell hardness of 490 and is cadmium plated.

Two-Stage Centrifugal Pump

A 2½ in. by 1½ in., two-stage centrifugal pump has been announced by Allis-Chalmers Manufacturing Company, Centrifugal Pump Division, Milwaukee, Wisconsin, as a supplement to its line of single-stage "SSUnit" type pumps. This pump, available with squirrel cage, splash-proof or explosion proof motor of from 10 to 30 hp., has a capacity range of from 50 to 100 g. p. m. against heads of from 300 to 500 ft. Its impellers are placed back to back on a motor shaft extension with the suction impeller next to the motor. The discharge passage from the first stage impeller is cast integral with the main casing body and communicates with a passage in the cover leading to the inlet of the second stage impeller. This design permits the cover to be taken off, and the inside parts of the pump to be taken out, without disconnecting the suction and discharge piping.



GOVERNMENTAL

CUSTOMS CASES

The decision of the United States Customs Court that vat-lined board imported at Buffalo from Canada for use in the manufacture of wallboard is dutiable at the higher rate for vat-lined board was sustained by the United States Court of Customs and Patent Appeals on an appeal by the importers. The test case involves several hundred later shipments, all being held for duty at 30 per cent and not admitted at 10 per cent, as claimed by the importers. Under the Canadian reciprocal trade agreement, however, this board will henceforth be dutiable at 15 per cent. In this case, as in all Customs Court cases, the Import Committee of the American Paper Industry has co-operated with Government officials by providing witnesses from the paper industry whenever needed.

Twenty-eight cases involving shipments of German sensitized photographic paper were decided by the United States Customs Court in favor of the importer on the basis that there was a controlled market in Germany for such paper, and therefore no freely offered value on which to compute the duty.

A petition for remission of penalty duties for a shipment of kraft wrapping paper at Houston which was held to have been undervalued, was granted on the basis that there was no intent to defraud by the importer.

The court held that imitation stained glass paper imported from Germany at Peoria, Ill., had been valued at only half of the true foreign dutiable value.

A case initiated in 1935 at Bridgeport, Conn., involving the dutiability of imitation gold beaters skins has been decided, the court holding that six shipments were dutiable as greaseproof paper, and not duty free as gold beaters skins.

◆

▶▶▶ A NEW ADJUSTED SCALE OF FREIGHT RATES has been docketed by Maine carriers on pulpwood from Wintersport, Ashland, St. Francis, and Blanchard to Augusta, Brunswick, Bucksport, Great Works, Rumford, and West Enfield.

PAPER INDUSTRY COMM. AIDS N. Y. WELFARE FUND

The committee of paper industry leaders, one of the eighty-two industrial and commercial groups organized to assist the $10,000,000 appeal of the Greater New York Fund aiding private welfare and health agencies, is rapidly matching the progress of other committees engaged in the campaign, Fund officials announce. Sub-committees have been established by General Chairman Roy K. Ferguson, president of the St. Regis Paper Company for each of the fifteen divisions of the industry.

The divisions and their chairmen include: Bag, Pierre E. Bonin, Union Bag and Paper Company; Book Paper, N. R. Hopkins, Oxford Paper Company; Bond and Writing Paper, Thomas A. Hendry, Mead Sales Company; Container, Samuel Samuel, American Pulp and Paper Company; Envelope, James L. Wiley, Berlin & Jones Company, Inc.; Groundwood,

THE DRAPER FELT

Unexcelled for strength, openness, resiliency, and general running qualities. Made to meet the most exacting conditions on all types of machines and all kinds of papers. Only one grade and that the highest.

Made by

DRAPER BROTHERS COMPANY

CANTON, MASS.

Woolen Manufacturers Since 1856

REPRESENTATIVES

L. H. BREYFOGLE, Kalamazoo, Mich.

C. K. BEECHER, Delaware, Ohio

E. G. Murray, St. Regis Paper Company; Kraft, E. R. Gay, St. Regis Paper Company; Newsprint, Arthur Schroederm, Pejepscot Paper Company; Paper Merchants, Lucius Sayre, Canfield Paper Company; Pulp and Paper Importers and Exporters, Fred Enders, Bulkley, Dunton and Company; Sulphite, J. B. Cowie, Hollingsworth and Whitney Company; Tagboard, L. R. Lyman, Missisquoi Corporation; Tissue, George Stuhr, International Paper Company; Waste, H. Prentiss Christian, and Waxing, Gumming, Paper Specialty, Fred W. Cole, Fraser Industries, Inc.

◆

PRESIDENT SIGNS WALLGREN BILL

The Wallgren Bill, which establishes a national park on the Olympic Peninsula of Washington State, important timber area and pulp and paper industrial section, received its final endorsement on June 29 by the President's signature.

The bill, introduced by Representative Mon. C. Wallgren of Washington, as amended by house and senate conferees, provides for a minimum park acreage of 635,000 acres. It gives the President the right within eight months, to proclaim the addition of lands increasing the area to a maximum of 898,292 acres after consulting with the secretaries of agriculture and interior and the Governor of the State of Washington. Nucleus of the park is the original Mount Olympus National Monument, an area of about 300,000 acres.

◆

▸▸▸ WASHINGTON REPORTS HAVE IT that the paper industry will be among the first four to be investigated under the action of Congress providing for an investigation of the general problem of monopolies as a basis for future legislation on this question.

◆

N. E. SHIPPERS OPPOSE PROPOSED PRICE ADVANCES

New England shippers to the west coast had planned to be present at the hearings in New York on July 5, when the proposed 5 to 10 per cent advance in inter-coastal paper rates will be opposed. The Inter-coastal Steamship Operators Conference had filed new rates to become effective July 25. Paper shippers oppose the advances while steamship operators argue that they need greater revenue to meet costs of service and that all rail rates have been advanced. It is understood that increased rates on wood pulp from the west coast is a pending proposal which will be docketed with the Maritime Commission late this summer.

◆

VINSON BILL IS VETOED

The efforts of the paper industry to prevent arbitrary action in cases where stream pollution is believed to exist culminated with the veto by President Roosevelt of the so-called Vinson Bill, which provides for a scientific study of the stream pollution problem under the federal public health service. The paper industry, realizing the importance of a proper solution of this grave problem, had sought for a scientific study of the problem before any radical legislation is enacted, but other bills in Congress were so rigid as to permit the shutting down by federal authority of plants which were found to be polluting the streams. These rigid measures were defeated and a study plan authorized instead, but the President's veto leaves the issue exactly where it started.

WISDOM is knowing *what* to do

SKILL is knowing *how* to do it

VIRTUE is doing it *well*

Kalamazoo Vegetable Parchment Co.

Parchment, Kalamazoo, Michigan

PAPERMAKING PATENTS

IN THE UNITED STATES — Compiled by James Atkins, Registered Patent Attorney

Inquiries should be addressed to James Atkins, Munsey Building, Washington, D. C.

Dandy Roll and Cylinder Mold and Method of Making Same

Patent No. 2,117,217. Peter S. Sinclair, Holyoke, Mass. Application January 22, 1936, Serial No. 60,270. 7 Claims. (Cl. 245—10). A seam for the woven wire covering of a dandy roll comprising a woven wire fabric having two edges on opposite sides of the seam, said edges extending parallel to the weft wires and transversely of the warp wires, the weft wire nearest to each edge being positioned slightly back therefrom so that the ends of the warp wires project beyond said weft wires, a member of fusible material positioned between the projecting warp wires of each edge, and means for controlling the flow of solder upon the application of heat so that the amount of solder flowing between the abutting ends of the warp wires is increased and the amount of solder drawn along the warp wires away from the edge is decreased.

Fibrous Products

Patent No. 2,113,298. Henry A. Ellis, Sharonville, and William A. Slattery, Hamilton, Ohio, assignors to The Philip Carey Manufacturing Company, a corporation of Ohio. Application April 3, 1933, Serial No. 664,211. 17 Claims. (Cl. 92—3). A felted sheet product comprising textile fibers felted into a sheet having relatively high tensile strength resulting from preparing the pulp from which the sheet is formed by separating a majority of the fibrous stock into individual fibers of substantially uniform size and character without reducing the length of the fibers. A method of fabricating felt comprising rolling rag scrap material in the presence of a fluid between a series of loose rollers for separating the fibers of the rag scrap material to reduce said material to a pulp in which a majority of the fibers are not reduced in length and are substantially uniform in size and character, felting the pulp into a highly porous sheet and impregnating the sheet with waterproofing material.

Waterproof Compound

Patent No. 2,115,797. Maurice Henri Belloc, Paris, France, assignor to Societe Nobel Francaise, Paris, France, a joint-stock company. Application March 2, 1936, Serial No. 66,697. In France March 7, 1935. 4 Claims. (Cl. 134—13). A resinous liquid coating composition for waterproofing paper, fabrics and regenerated cellulose comprising a resin selected from the group consisting of water insoluble condensation products of polyvinyl alcohol and acetic paraldehyde, polyvinyl alcohol and a mixture of formaldehyde and acetic paraldehyde, and polyvinyl alcohol and trioxymethylene; a minor proportion of a waterproofing agent selected from the group consisting of paraffin, natural waxes, synthetic waxes, and chlorinated naphthalenes, said waterproofing agent being present in the proportion of 1 part waterproofing agent to 16 to 20 parts of said resin, said amount being sufficient to increase the water resistance of the coating; and a volatile organic solvent for both the said waterproofing agent and the said resin in amount sufficient to dissolve the same.

Thickness Indicator for Paper Making Machines

Patent No. 2,117,841. Patrick J. Fitzgerald, Torrington, Conn., assignor to The Fitzgerald Manufacturing Company, Torrington, Conn., a corporation of Connecticut. Application September 19, 1935, Serial No. 41,194. 6 Claims. (Cl. 33—172). Indicating apparatus of the class described, comprising a frame, a lever pivotally carried by the frame, roller means at one end of said lever, a weight on said lever for yieldably urging the roller means in one direction, said weight being disposed on the side of the pivotal mounting of the lever opposite from the roller an indicating dial carried by the frame, and operative driving connections between the indicating dial and the end of said lever opposite from the roller-carrying means.

Light Sensitive Paper and Method of Treating Same

Patent No. 2,113,423. Clyde A. Crowley, Chicago, and George H. Goodyear, Evanston, Ill., assignors to The Huey Company, Chicago, Ill., a corporation of Illinois. Application April 30, 1937, Serial No. 139,950. 4 Claims. (Cl. 95—6). A coating for blue print paper comprising a light-reduceable ferric complex, a ferricyanide salt and ammonium nitrate.

Apparatus for Treating Waxed Webs

Patent No. 2,115,283. Adolph Potdevin, Garden City, N. Y., assignor to Potdevin Machine Company, Brooklyn, N. Y., a corporation of New York. Application May 31, 1935, Serial No. 24,294. 11 Claims. (Cl. 91—18). Apparatus of the class described, comprising in combination means for effecting the continuous advance of a waxed paper web, heating elements in the path of said traveling web for fusing the surface wax of said web at spaced intervals, and means in the path of said web for subsequently removing the fused wax.

Sizing Paper

Patent No. 2,116,768. Ben W. Rowland, Appleton, Wis., assignor to Institute of Paper Chemistry, Appleton, Wis., a corporation of Wisconsin. Application December 7, 1934, Serial No. 756,533. 3 Claims. (Cl. 134—20). A method of preparing a paper pulp sizing solution containing acid precipitable colloidal particles of rosin which comprises adding to a dilute aqueous solution of alkali resinate about 10 to 50 per cent soya bean casein based on the weight of the alkali resinate, allowing the mixture to stand until the casein has become dispersed and the alkali resinate has become at least partially hydrolyzed as indicated by the increasing turbidity of the solution.

Starch Sizing of Paper

Patent No. 2,113,034. Ben W. Rowland, Appleton, Wis., and Jordan V. Bauer, Chicago, Ill., assignors to Stein, Hall Mfg. Co., Chicago, Ill., a corporation of Delaware. Application June 5, 1935, Serial No. 25,124. 5 Claims. (Cl. 92—21). The improvement in the art of paper-making which comprises introducing into the furnish, before the completion of the beating operation, an alkaline dispersion of a tough starch produced by treating a raw starch with formaldehyde and an acid catalyst and, prior to the paper-making operation, adding sufficient acidic material to the furnish to precipitate said starch upon the fiber in finely divided form.

Conditioning of Cellulose Fiber for Conversion into Cellulose Acetate

Patent No. 2,112,999. George A. Richter, Berlin, N. H., assignor to Brown Company, Berlin, N. H., a corporation of Maine. Application May 2, 1936, Serial No. 77,612. 17 Claims. (Cl. 260—101). A process which comprises treating cellulose fiber with a mixture of hydrogen peroxide and acetic acid and then acetylating the treated fiber in the presence of not much more than about 2 per cent water, based on the dry weight of cellulose fiber.

Art of Wrapping Toilet Paper and the Like

Patent No. 2,113,078. Samuel J. Campbell, Green Bay, Wis. Application July 17, 1936, Serial No. 91,148. 15 Claims. (Cl. 93—2). A method of wrapping which includes the advance of a continuous web of wrapping material, the deposit thereon of articles to be wrapped, and the control of such deposit directly with reference to the advance of the wrapping material, whereby such deposit is dependent upon the presence of wrapping material and does not require any common actuating connections for such advance and such deposit.

Paper Making Machine

Patent No. 2,116,763. Herman L. Kutter, Hamilton, Ohio, assignor to The Black-Clawson Company, Hamilton, Ohio, a corporation of Ohio. Application July 16, 1935, Serial No. 31,641. 6 Claims. (Cl. 92—43). In paper making apparatus, a mix box, a forming screen, and a stuff pipe extending from said mix box for supplying paper pulp stock to the forming screen, said mix box having baffle means producing an abrupt change in the direction of flow and providing for downward movement of the stock toward the stuff pipe, and means at a low point in the mix box for collecting air from the stock as the stock travels toward the stuff pipe.

CHEMICAL LINING ENGINEERS INC.

ACID AND ALKALINE CHEMICAL RESISTING LININGS

Delivered - Installed - Guaranteed

832 Builders Exchange

MINNEAPOLIS, - MINN.

THE RUST ENGINEERING CO.

CLARK BUILDING

PITTSBURGH, PA.

LINCOLN BLDG. NEW YORK, N. Y.

DISTRICT BANK BLDG. WASHINGTON, D. C.

MARTIN BLDG. BIRMINGHAM, ALA.

6 N. MICHIGAN AVE. CHICAGO, ILL.

SPECIALIZE IN

CONSTRUCTION

COMPLETE PULP AND PAPER MILLS
INDUSTRIAL PLANTS
POWER PLANTS
BRICK AND CONCRETE CHIMNEYS

HARDY S. FERGUSON & COMPANY

CONSULTING ENGINEERS

200 FIFTH AVENUE **NEW YORK CITY**

Hardy S. Ferguson—*Member A.S.C.E. A.S.M.E. E.I.C.*
Moses H. Teaze—*Member A.S.C.E. A.S.M.E. E.I.C.*

Consultation, reports, valuations, and complete designs and engineering supervision for the construction and equipment of

PULP AND PAPER MILLS
AND OTHER INDUSTRIAL PLANTS
STEAM AND HYDRO-ELECTRIC
POWER PLANTS
DAMS AND OTHER HYDRAULIC
STRUCTURES

GEORGE F. HARDY

Consulting Engineer

305-309 Broadway, New York City, N. Y.

Member—Am. Soc. C. E.—Am. Soc. M. E.—Eng. Inst. Can.

Consultation	Paper and Pulp Mills
Reports	Hydro-Electric and
Valuations	Steam Power Plants
Estimates	Plans and Specifications

Positive Pneumatic Conveyors

for *clean* and *safe* handling of
Pulp Wood Chips, etc. and Bark (wet or dry)

A & C Charger and Blower Conveying Wet Hogged Bark to Stokers

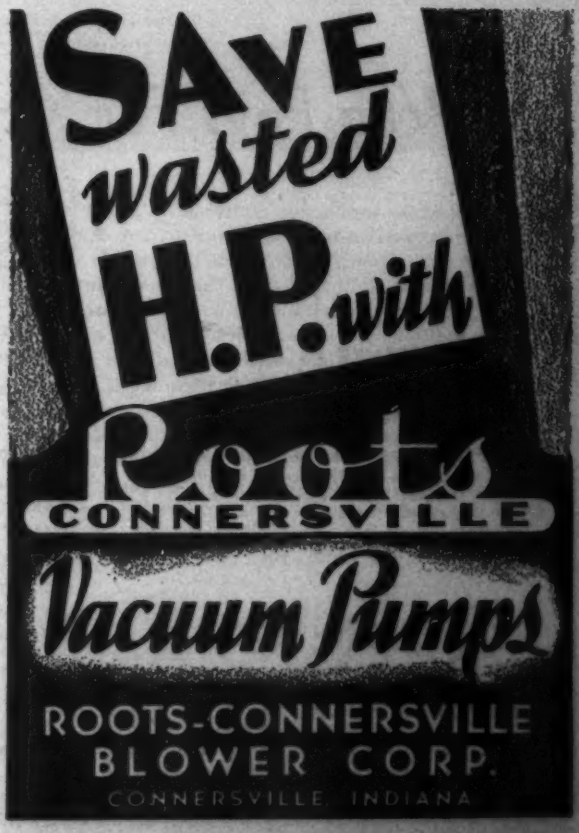
Allington Stokers for wet or dry Hogged Wood Chips, Bark, etc., give more steam per pound of fuel

The Allington & Curtis Mfg. Co.

SAGINAW, MICHIGAN
Leaders Since 1886

Boston Chicago New York New Orleans

Dust Collecting Systems—Storage Vaults and Unloaders—Slow-speed Low-power Fans



SAFETY

PAPER CITY SHOWS 'EM HOW IT'S DONE

A unique attempt to defeat the recession was reported recently from the city of Holyoke, Mass.

Taking for a slogan "Wanted—50,000 Salesmen to Sell Holyoke," every paper manufacturer held booth and window displays for one entire week recently in an effort to give the populace a better idea of the type of merchandise being made in that city. This plan was also carried out by the textile manufacturers and other industries.

On specified days during the prescribed week, various paper mills held "open house" during which time officials conducted guests through the plants to show them the process of papermaking from its inception to the finished product. The entire plan, prepared by a special committee, received state wide notoriety.

◆

THE GOLFING SEASON of the New York Division of the Salesmen's Association of the Paper Industry began on June 15 with a tournament at the Green Meadow Club, Westchester County, New York, in which nearly forty players participated.

▶▶▶ *Ernest Watson* of Merritton, Ontario, was painfully injured as a result of an accident when he was caught in the dryers at the Garden City Paper Mills, St. Catherines, Ontario.

◆

SAFETY PROGRAM AT K-C PLANT

About 150 employees of Kimberly (Wis.) mill of the Kimberly-Clark Corporation attended a safety program recently at the community clubhouse. The program given in conjunction with the safety contest, was sponsored by the Blues, which includes the beater room, electrical, steam and chlorine departments.

Talks were given by Harold Heller, superintendent of the chlorine department and by Dud Courchane of the personnel department. The mill had passed its fifty-fourth day without a lost-time accident and employees were urged to strive for the 100-day goal.

▶▶▶ THE PORT EDWARDS FINISHING ROOM of the Nekoosa-Edwards Paper Company, Port Edwards, Wisconsin, has completed 119,000 man hours without a single lost time accident during the first five months of 1938. As part of the safety drive, Ed. Hesse, foreman, issues a monthly safety reminder bulletin for all employees.

◆

▶▶▶ ASHEVILLE, N. C., WAS THE SCENE of the ninth annual North Carolina State-Wide Safety Conference on June 10-11. Fifteen hundred delegates were registered.

◆

▶▶▶ Severe injuries were suffered by *Vincent Wolashek*, employed at the Stevens Point (Wis.) mill of the Consolidated Water Power and Paper Company, when his shirt was caught between a pulley on a machine chest agitator and the support. He was assisting the millwright in putting the belt on the pulley and was caught when the belt started in motion.

Who Pays For Accidents?

Impressive . . .

A large paper manufacturer employing approximately 1,000 workers started an intensive safety program in 1925. During the following eight-year period they reported a $71,000 saving, despite the fact that employment had gradually increased as well as the payments under the State Compensation Law.

FEW executives realize that insurance covers only the direct losses from accidents, or **one-fifth** of the annual bill. As estimated by insurance authorities, the other four-fifths are indirect losses and are not insurable.

If it is important to have protection against 20% of the cost, how much more necessary is it to concentrate on the remaining 80%?

Practical and effective organization for safety as applied by the Paper and Pulp Section of the National Safety Council provides the solution. In the decade 1926-1936 several hundred organizations in this field have, as a group reduced the frequency and severity of accidents 64% and 61% respectively, a savings of millions of dollars within the industry.

A copy of "Organizing a Complete Industrial Safety Program," together with full information will be sent you gladly upon request. Simply drop us a line on company stationery.

PAPER & PULP SECTION NATIONAL SAFETY COUNCIL TWENTY NORTH WACKER DRIVE CHICAGO ILL.

The Paper Industry Safety Contest

July 1, 1937 to June 30, 1938

Cumulative Scores as of May 31

9 Mills Have Perfect Record

PERFECT SCORES

Division I—Paper and Pulp Mills

	PARTICIPANT	MILL	LOCATION
A			
B			
C			
D	Bird & Son, Inc.	Phillipsdale	Rhode Island
	Rogers Fibre Co., Inc.	Bar Mills	Maine
	Hollingsworth & Whitney Co.	Aroostook & Cobbossee Mills	Gardner, Maine
	The Mead Corporation	Nashville	Tennessee
	International Paper Co.	Mill No. 23	Riley, Maine

Division II—Paper and Board Re-Manufacturing

Bird & Son, Inc.	Chicago	Illinois
Texas Corrugated Box Co., Inc.	Dallas	Texas
Bemis Bros. Bag Co.	East Pepperell	Massachusetts
Bay West Paper Company	Green Bay	Wisconsin

IMPERFECT SCORES

	Key Number	Rank	Disabling Injuries	Frequency Rate
GROUP A	P- 44	1	2	1.346
	P-120	2	2	1.374
	P- 19	3	4	3.321
	P-108	4	11	4.363
	P-121	5	8	4.926
	P- 84	6	11	6.011
	P- 10	7	9	6.384
	P- 13	8	10	6.492
	P- 30	9	9	6.834
	P- 12	10	10	6.880
	P- 28	11	29	6.924
	P- 21	12	10	7.685
	P- 18	13	16	8.075
	P- 1	14	24	8.750
	P- 97	15	12	9.302
	P- 69	16	17	9.782
	P-136	17	15	10.178
	P- 9	18	27	10.512
	P- 62	19	23	11.573
	P- 11	20	14	11.917
	P- 23	21	15	12.711
	P- 27	22	34	13.263
	P-102	23	23	14.539
	P- 73	24	38	15.234
	P- 67	25	42	16.767
	P- 64	26	22	17.672
	P- 40	27	52	27.057
	P- 87	28	58	29.236
	P- 71	29	46	34.081
	P-140	30	56	36.931
	P- 32	31	52	37.308
GROUP B	P- 22	1	2	2.042
	P-135	2	2	2.361
	P-133	3	5	5.329
	P- 72	4	4	5.503
	P- 4	5	4	5.783
	P- 68	6	6	5.789
	P- 58	7	6	6.618
	P- 60	8	7	7.034
	P-143	9	6	8.639
	P-142	10	8	10.254
	P- 2	11	11	11.157
	P- 59	12	9	11.401
	P- 15	13	10	12.282
	P-122	14	11	12.882
	P- 26	15	13	14.149
	P- 45	16	12	14.373
	P-112	17	14	14.313
	P-138	18	13	14.977
	P- 16	19	12	15.063
	P-107	20	16	15.171
	P-123	21	13	15.960
	P- 3	22	17	17.915
	P-137	23	14	18.909
	P-120	24	18	20.413
	P- 25	25	21	20.731
	P-124	26	20	24.618
	P-130	27	27	26.193
	P- 82	28	22	28.733
	P-104	29	26	32.742

May report missing—covers ten months only:
P-120, P-82, P-119, P-37, P-34, P-35, P-36, P-38, R-9.

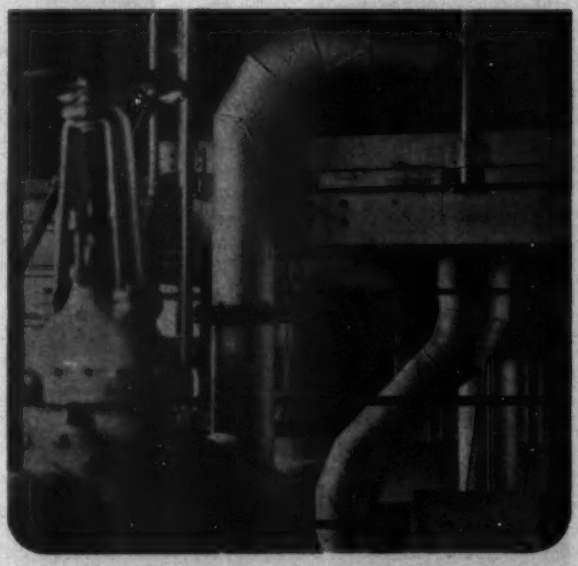
	Key Number	Rank	Disabling Injuries	Frequency Rate
GROUP C	P- 55	1	1	1.756
	P- 56	2	2	3.960
	P- 89	3	3	6.125
	P- 43	4	3	7.307
	P- 88	5	5	8.724
	P-119	6	5	9.304
	P- 61	7	5	10.390
	P- 70	8	7	10.681
	P- 37	9	5	11.671
	P- 52	10	7	16.227
	P- 94	11	7	20.257
	P- 46	12	12	21.318
	P-113	13	11	24.740
	P- 48	14	10	27.581
	P-103	15	10	28.537
	P- 47	16	11	28.635
	P- 41	17	19	30.963
	P- 29	18	15	33.384
	P- 24	19	15	37.406
	P-111	20	22	43.150
	P- 80	21	18	47.097
	P- 17	22	18	50.199
GROUP D	P- 5	6	1	3.668
	P- 86	7	1	6.489
	P- 93	8	2	12.233
	P-110	9	1	12.459
	P- 90	10	2	12.557
	P-125	11	2	12.857
	P-117	12	3	13.665
	P- 35	13	2	14.678
	P-141	14	2	16.020
	P- 50	15	4	16.076
	P- 91	16	5	16.411
	P-129	17	4	16.735
	P- 99	18	3	17.774
	P- 49	19	4	18.656
	P- 7	20	5	19.828
	P- 42	21	4	20.095
	P-106	22	5	20.136
	P- 6	23	5	20.348
	P- 63	24	5	20.542
	P-134	25	5	21.668
	P- 98	26	5	25.119
	P-128	27	6	25.210
	P- 14	28	9	27.725
	P-116	29	9	28.332
	P- 81	30	7	28.413
	P- 36	31	6	28.603
	P- 38	32	3	34.990
	P- 65	33	5	40.174
	P-131	34	5	46.986

Division II—Paper and Board Re-Manufacturing

	R- 2	5	1	1.379
	R-23	6	3	3.452
	R-20	7	5	5.406
	R-19	8	2	6.165
	R-13	9	2	6.855
	R-21	10	4	7.367
	R-10	11	6	11.983
	R-27	12	7	18.145
	R-24	13	8	18.499
	R-28	14	11	21.305
	R-11	15	3	23.887
	R- 9	16	5	24.232
	R- 1	17	15	26.266
	R-26	18	12	31.391
	R- 4	19	6	55.678

"IT WENT TOGETHER

Slick as a Whistle"



Just think of the time and money saved in this mill with Armco Spiral Welded Pipe. Unnecessary flanges were eliminated and erection greatly simplified—all because the entire assembly, including connections, was *pre-fabricated to fit a definite layout.*

This "tailor-made-for-the-job" method of fabricating pipe has long been a specialty at Armco. With our experienced personnel and modern welding facilities, we have learned how to turn out the most complicated pipe assemblies promptly, accurately, and economically.

Just mail your pipe layouts and specifications today for diameters 6 to 36 inches; wall thicknesses 12 gage to ½-inch. The American Rolling Mill Co., Pipe Sales Division, 2591 Curtis St., Middletown, O.

ARMCO

Armco

SPIRAL WELDED PIPE

ALLIED

BANTAM BEARINGS SHIPPED BY AIR TO PHILIPPINES

To ship such items as roller bearings by air is in itself a rather unusual procedure but when they are shipped via air from South Bend, Indiana, to Manila, Philippine Islands, the accomplishment is indeed newsworthy.

The Bantam Bearings Corporation of South Bend, Indiana, in order to meet an emergency, recently shipped two roller bearings to the Philippine Islands via the air ways. The occasion for this shipment occurred when it was discovered that a dredge used to dig gold from sixty-five feet beneath a river bed was in danger of a breakdown due to worn bearings. To make sure of the exact requirements and get the needed background of mining conditions, A. H. Frauenthal, general manager of the Bantam Bearings firm, arranged to talk by long distance to the engineer in charge at Manila, ten thousand miles away. In nine minutes all details were made clear so that successful compliance with the order was assured.

The shipment was started at South Bend by the American Airlines through Air Express, was picked up at Chicago by the United Airlines, sent to San Francisco and left for its final destination via the Pan-American Transpacific Clipper. Shipment, which would ordinarily take twenty-eight days by the fastest boat, was cut down to five and a half by Clipper Ship . . . making a saving of twenty-two and a half days.

Start of the air shipment of Bantam Roller Bearings from South Bend, Indiana, to Manila, Philippine Islands. Shown above is the first plane being loaded at South Bend.

HARNISCHFEGER'S 10,000TH CRANE

A rather dramatic episode took place recently in the shops of the Harnischfeger Corporation in Milwaukee, Wisconsin, as a group of men interestedly inspected a huge, brilliantly painted, 40-ton P & H crane, in all respects a duplicate of many which have been produced at the plant but, nevertheless, attaining a unique distinction of being the 10,000th such crane manufactured by the Harnischfeger Corporation.

The founders of Harnischfeger Corporation, Messrs. Pawling and Harnischfeger, first started in the overhead traveling crane industry in 1896 with the first 3-motor overhead traveling crane. This latest crane, "No. 10,000," represents over $100,000,000 worth of lifting, lowering and moving equipment manufactured by the company. Ben Van Horn, sales manager of the P & H Crane Division of the company, affixed the plate bearing "No. 10,000" under the nameplate, while Harnischfeger and buyer company executives looked on.

Ben Van Horn, sales manager of the P & H Crane Division of the Harnischfeger firm, is shown affixing the number "10,000" on the 10,000th crane produced by the Harnischfeger Corporation, Milwaukee, Wis.

◆

MOBILE, ALA. SITE OF NEW AMERICAN CYANAMID PLANT

A new chemical plant will be constructed shortly by the American Cyanamid & Chemical Corporation on a site on the terminal railway of the Alabama State Docks Commission in Mobile, Alabama. Construction of the first unit will start immediately and the chief product will be sulphate of

APPLETON

wires are GOOD

WIRES

MONO-PLANE WEAVE
PHOSBLOY WIRES
APP-WELD

APPLETON WIRE WORKS. INC.

APPLETON, WISCONSIN

---

for SPEED *with Quality*

is a matter of proper Roll Temperatures!

The Cambridge is made with an extension attachment to reach otherwise inaccessible rolls.

In paper making you can overheat your rolls and speed up drying . . . at the cost of quality. Or you can underheat them, slow up production and still gain nothing in quality. There is a point, however, where production is at a maximum and quality is high. The use of a Cambridge Pyrometer for quickly checking roll surface temperatures will help you to maintain this happy medium.

Cambridge Instrument Co., Inc.
3732 Grand Central Terminal
New York City

CAMBRIDGE
Mold, Surface and Needle
PYROMETERS

Send for descriptive literature. The use of these instruments will help you make better paper.

Knox Felts

EXCELSIOR Knox Woolen Co. Camden, Me. FINE & JACKET

HIGH POROSITY

. . as a characteristic of a paper maker's felt will, not only add to the life of felt, but saves time lost on the machine due to excessive shut downs for washing. Specify

EXCELSIOR FELTS

and minimize this trouble. Made by the Knox Woolen Co., of Camden, Maine, since 1864.

BULKLEY, DUNTON & CO.

295 Madison Ave. New York, N. Y.

CAledonia-5 5260-68

alumina, which is used for water purification and in the manufacture of paper.

The company has also procured a tract of land at Savannah, Georgia, on which to build a plant for the manufacture of miscellaneous heavy chemical, including sulphate of alumina.

◆

DEDICATE G-E BUILDING AT N. Y. FAIR SITE

Officials of the General Electric Company celebrated, on June 22, both the company's 60th year of existence and the beginning of construction on its building for the New York World's Fair by driving a copper cachet 90 feet into the ground at Flushing, L. I. The copper tube, containing a dedication, photographs of the fair grounds and model of the G-E building, and the list of those officiating and attending, served as a modern version of the conventional cornerstone-laying. Charles E. Wilson, executive vice-president of the company, with the expert assistance of the regular crew, operated the pile driver which drove the dedicatory receptacle deep into the ground.

◆

BETZ DESIGNS NEW WATER UNIT FOR NAT'L BISCUIT CO.

The National Biscuit Company has retained W. H. & L. D. Betz, chemical engineers of Philadelphia, as consultants and designers of a water conditioning plant for process water at its Marseilles (Ill.) carton factory. The capacity of this mill is being increased to 175 tons of board per day, and will include the manufacture of a white coated board which will require clean water. The water conditioning plant will have a capacity of 900 gallons per minute, of which 650 g.p.m. will be taken from the Illinois River. Construction of the plant is scheduled for this summer.

◆

DR. JESSUP NOW ON J-M BOARD

In order to establish a policy of widening the board of directors' membership to include not merely stockholders' interests but direct representation for the viewpoint of the general public, the Johns-Manville Corporation recently elected to its board, Dr. Walter A. Jessup, president of the Carnegie Foundation for the Advancement of Teaching.

C. E. Wilson, G-E executive vice-president, fastens copper "cornerstone" to pile before driving as New York's Grover Whalen, left, and Owen D. Young, center, G-E board chairman, look on.

Dr. Jessup, who has had a long and distinguished career as an educator, will serve this purpose of interpreter of the public viewpoint in correlating modern corporation policies with these newer concepts. According to the announcement, this new policy is "in recognition of the new era of broadened social responsibility upon which American industry is now entering."

◆

INT'L NICKEL HAS NEW FIELD OFFICE

The International Nickel Company, Inc., has established a new field office located in the Grant Building, Pittsburgh, Pa., it was announced recently. The office, which was opened June 1, is under the direction of H. V. Beasley, who for the past three years has been attached to the New York office. The main function of this office will be to promote application of nickel alloy steels and products of the Huntington Mill and stimulate interest in nickel cast irons and the use of nickel in nonferrous alloys.

◆

E. F. HOUGHTON ORGANIZES NEW RESEARCH DIV.

Announcement of a new division of its Research Department to be known as the "Paper Processing Research" is made by E. F. Houghton & Co., Philadelphia, Pa. This department is organized for the purpose of aiding concerns in the pulp and paper industry to improve quality and lower production costs. H. C. Roberts is manager of the new division.

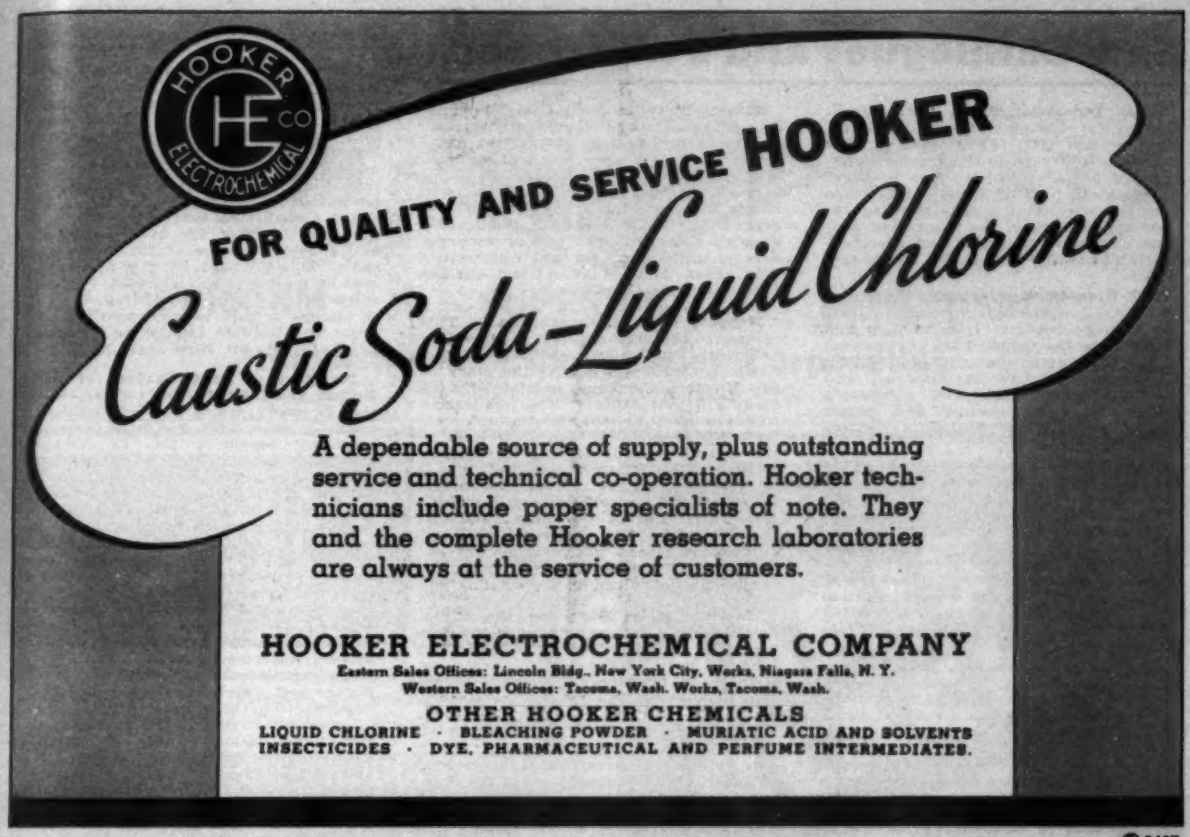
Interesting progress has already been made along such lines as the development of water repellents, defoamers, wax sizing, wetting-out agents, soaps, emulsifiers, surface-active chemicals, softeners, sulphonated oils and fats, penetrants, sizes and anti-frost materials.

◆

▶▶▶ THE HILL CLUTCH MACHINE & FOUNDRY COMPANY, formerly located at 44 Main Street, Orange, N. J., have now re-established their New York address at 90 West Street. The office will continue to operate as the Eastern Branch for power transmission and agitator sales.

◆

▶▶▶ Formerly sales representative of the Amthor Testing Instrument Company, *J. Timothy O'Hara* has organized his own sales agency and will deal principally in new and reconditioned testing instruments, principally for the paper, wire, rubber and cordage industries. The office of the agency will be 620 E. 43rd Street, Brooklyn, N. Y.


HOOKER
HE CO
ELECTROCHEMICAL
FOR QUALITY AND SERVICE HOOKER
Caustic Soda-Liquid Chlorine
A dependable source of supply, plus outstanding service and technical co-operation. Hooker technicians include paper specialists of note. They and the complete Hooker research laboratories are always at the service of customers.
HOOKER ELECTROCHEMICAL COMPANY
Eastern Sales Offices: Lincoln Bldg., New York City. Works, Niagara Falls, N. Y.
Western Sales Offices: Tacoma, Wash. Works, Tacoma, Wash.
OTHER HOOKER CHEMICALS
LIQUID CHLORINE · BLEACHING POWDER · MURIATIC ACID AND SOLVENTS
INSECTICIDES · DYE, PHARMACEUTICAL AND PERFUME INTERMEDIATES.

8467

High Density
BEATERS

Hundreds of highly successful installations in service.

THE MIDWEST-FULTON MACHINE COMPANY
DAYTON, OHIO, U. S. A.

WATERBURY FELTS

Are Made By

H. WATERBURY & SONS CO.

ORISKANY, NEW YORK

FREDERICK Centrifugal PUMPS

CLOGLESS FOR HI-DENSITY STOCK

CENTRIFUGAL PUMPS FOR ALL PAPER MILL PURPOSES

ASH CONVEYORS——————STOKERS

THE FREDERICK IRON & STEEL CO.

DEPT. D. FREDERICK, MARYLAND

New Catalogues and Publications

Baker Industrial Truck Div., Baker-Raulang Co., Cleveland Ohio—A new 17-page bulletin (No. 50) illustrating and describing the various lift trucks manufactured by this company has been released lately by the firm. This release is replete with photographs showing various applications of the trucks and contains numerous diagrams and specification tables as to construction and adaptability.

S. R. Dresser Manufacturing Co., Bradford, Pa.—Just recently published is this new 12-page booklet "How to Join and Repair Pipe the Quick, Easy, Permanent Way," which gives operating men helpful information on how to construct and maintain pipe lines. The company's couplings, repair clamps and repair sleeves are fully described and their uses explained in this booklet.

Fairbanks Co., New York, N. Y.—This company has recently issued a splendid new catalogue (No. 52) describing and explaining the construction and uses of the various hand trucks, platform trucks, lift trucks, skid platforms and other similar equipment. This release, 46 pages in length, contains many illustrations of the company's products and in addition describes, by means of clearly-written material and specification tables, all features of same.

Farrel-Birmingham Co., Inc., Buffalo, N. Y.—An extremely handsome catalogue (No. 438) has been published recently by this company. Bound in a red and silver cover, the issue contains 80 pages of data, written material, diagrams and photographs relative to the company's Farrel-Sykes gears and gear units. In addition to the complete detailed matter, there is ample literature and much graphic material included in this publication which, incidentally, is spiral-bound and punched for loose-leaf filing.

Foxboro Co., Foxboro, Mass.—A new 32-page bulletin describing the company's electrically operated control instruments for applications where "open and shut" or two-position control is desired. Over sixty illustrations are contained in this release, showing installations and applications of the Rotax controllers. Included in this bulletin (No. 184-2) are technical details of instrument construction and operation, accompanied by a schematic diagram of a Rotax circuit for control at one point.

Garlock Packing Co., Palmyra, N. Y.—A new folder describing the new Bitan leather packings manufactured by this company has been released lately.

General Electric Co., Schenectady, N. Y.—Two new bulletins have recently been issued by this company. G-E controllers for synchronous motors are described in a detailed manner by use of photographs, written material and diagrams, in bulletin No. GEA-1724A. The company's brake-motor is described in bulletin No. GEA-2026A. The latter publication contains complete information on the operating characteristics, construction features and applications of the motor. Both bulletins are punched for loose-leaf filing.

Griscom-Russell Co., New York, N. Y.—Managers and engineers of plants in which process work involves heating or cooling of fluids will be interested in a new bulletin on heat transfer equipment for chemical services, recently issued by this firm. The bulletin lists features of more than 20 designs of chemical process heat exchangers, heaters, coolers, condensers and evaporators and includes a convenient self-indexing reference table listing the most suitable types of heat exchangers for each special fluid service.

Harbison-Walker Refractories Co., Pittsburgh, Pa.—A very attractive folder regarding the development of the company's refractories in which definite properties have been developed, has recently been published by this firm.

Jeffrey Manufacturing Co., Columbus, Ohio—This company has recently put out a very interesting and attractive catalogue (No. 660) describing and explaining the construction and usages of swing hammer shredders. Forty-seven pages in length and containing numerous photographs and diagrams, this publication presents a very clear picture of the products to the reader. Extensive literature aids other data in explaining various features of the shredders.

Koppers Co., Pittsburgh, Pa. — This company has just issued a strikingly beautiful publication entitled *Koppers Yearbook—1938*, which tells the story of the Koppers Company in the light of many different aspects. The publication contains many unusual photographic effects which serve to add materially to the various sections devoted to the divisions of the company. Included in this interesting book are sections presenting the company as a manufacturer, a processor of coal and as a taxpayer and employer. The careful manner in which the publication is laid out, together with its concise but complete information, makes it a book to be valued by any or all.

National Metal Edge Box Co., Philadelphia, Pa.—An extremely attractive brochure entitled *Planned Packaging* has recently been issued by this company. Using color photography to good advantage throughout, this release contains the story of metal edge packaging, showing the methods employed in usage and all the various features of the product itself. The bulletin features two pages devoted to questions and answers about the product and in general is so arranged that the reader can easily get a clear idea of the company's article. A unique idea is the presentation card affixed to the first page of the 17-page brochure, on which the name of the executive to whom the release is sent, will be filled in.

Pfaltz & Bauer, Inc., New York, N. Y.—Of special interest to research workers, chemists and laboratory men is the folder on fluorescence microscopy recently issued by this company. Much information is given regarding the equipment for this type of work and there are many illustrations, including three-color prints of micro-fluorescence phenomena.

Sprout, Waldron & Company, Inc., Muncy, Pa.—A new catalogue (No. 1900) illustrating and describing the various types of bucket elevators manufactured by this firm has been released lately. This publication, containing many illustrations and diagrams, gives a complete picture of the many different types of elevators and their component parts. Prices, dimensions and other data are included in the 56-page catalogue. The release is punched for loose-leaf filing.

Herman H. Sticht & Co., New York, N. Y.—A new bulletin (No. 715) recently put out by this company describes the chronometric type tachometer manufactured by the company. The bulletin explains the working principle of the instrument, gives its specifications and includes a partial list of users.

Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa.—A 20-page booklet devoted to the installations, applications and economies of socket instruments manufactured by this company has been released lately by this concern. The booklet points out that ammeters, voltmeters, wattmeters, watthour meters, recorders and test jacks may be conveniently plugged into these sockets. An interesting little booklet entitled "What To Check When You Select Steam Drives," has also been issued recently by this company. Diagrams and photographs are included in the release.

BOOKS

Chemical Publishing Company's Catalog No. 6—Of interest to technicians and professional men in all industrial fields is this new spiral-bound catalog which lists and describes chemical, bacteriological, pharmaceutical, medical, engineering, electrical and general scientific technical books of all American and British publishers. The catalog is ideally laid out in alphabetical manner and gives the name of the book, the author, the price and a brief resumee of the book's contents. This 150-page, 5¼x8¼ publication will be mailed to any chemist, engineer, scientist or professor sending 10 cents in stamps or coin to cover mailing. Address to Chemical Publishing Company, 148 Lafayette St., New York, N. Y.

Directory of Paper Makers of Great Britain and Ireland—The 1938 edition of this directory, which has been published annually since 1877, has been issued by Marchant Singer & Co., 15, Nicholas Lane, London, E. C. 4, England. The edition opens with a special article by Vincent S. Smith on "The Past Year in the Paper Trade." This article is followed, in part, with individual sections covering paper and board mills of Great Britain and Ireland; enamellers, surfacers, and converters of paper; mill representatives (London and Provinces); numerical and alphabetical index of mills; paper mills by counties; classification of makes of paper with maker's names; watermarks; trade names; principal rag merchants; china clay producers and merchants; and paper trade customs. The book also includes a list of members of the Paper Exporters' Section of the London Chamber of Commerce as well as a list of the various Paper and Allied Trades Associations with names and addresses of the Secretaries. The sales price of the book in the United States, as given by the publisher, is 5/10.

A Report of the Future of the Paper Industry in the Southeastern United States and the Effects on Stumpage Values—This report, a publication of The American Institute for Economic Research, 1200 Massachusetts Avenue, Cambridge, Massachusetts, discusses future demand for forest products; supply of forest products; past and probable future effects of technological developments; and future prices of paper, and of pulpwood stumpage in the South. A summary of conclusions also is presented as are several appendices. The appendices include a glossary; extracts from the Hale Report; and material covering the relative costs of materials, fuel, and purchased electrical energy to final value of product by representative industries, and the pulpwood situation in South Carolina. Bound in paper cover and printed by offset, the report is priced at $3.50 per copy.

Sand, Clays & Minerals—Volume III, No. 3, April, 1938, a publication devoted to economic minerals and published by A. L. Curtis, P. O. Box 61, Chatteris, Cambs., England, contains an article on a subject that is little known to the average paper-maker and yet should be of interest to him. The subject is "Mode, Occurrence and Preparation of China Clay." Its author is E. H. Davison. Another article in the issue that should have an appeal, particularly to paper mill chemists and technologists, treats of "Early Technical Balances." Both of the articles are well illustrated; but especially so is the latter, which is the work of A. Barclay, Keeper in the Science Museum, London. Among the individual subjects of the illustrations of the latter article are: Agricola's balances, 1556; Elizabethan coin balance, 1591; swan-neck balance from engraving on Coronelli's celestial globe of 1693; self-registering balance for weighing woolen skeins, 1765; and Ramsden's balance, 1789, as well as a number of others. The publication is priced by the publisher at 3/6.

ENGLISH ECCO CLAYS CLAYS

ECCO CLAYS TRADE MARK

UNIFORM • SUPERIOR • DEPENDABLE

English China Clays Sales Corporation
551 Fifth Avenue, New York City

NOPCO
"EVOLVED THRU RESEARCH"

FOR BETTER PAPER PRODUCTION

Foam Killers • Defoamers and Eveners • Sulphonated Oils
Pitch Emulsifiers • Penetrants • Wax Sizes • Glycerine
Soaps • Felt Washing Compounds • Glycerine Substitutes

NATIONAL OIL PRODUCTS CO.
HARRISON, N. J.
BOSTON CHICAGO CEDARTOWN, GA. SAN FRANCISCO

PARIS BLACKS

DIXIE AND KOSMOS PARIS BLACKS

Blacks known for their tone, strength and miscibility. They assure smooth, unvarying shades that last.

UNITED CARBON COMPANY
CHARLESTON, W. VIRGINIA

ACCO · Morrow
PRESSURE LUBRICATOR

No Special Fittings . .

Patented OILING SEAL TIP makes perfect contact with your present oil holes and most cups. All the lubricant goes into bearing. No waste.

10 MODELS GUN or OILER

Positive Lubrication

Light hand pressure builds 1000 lbs. pressure at tip—more than enough to force out all gum and grit and reach all parts with clean lubricant.

AMERICAN CHAIN & CABLE COMPANY, Inc., York, Pa., U. S. A.
In Canada: DOMINION CHAIN CO., Ltd., Niagara Falls, Ont.

VEST POCKET POWER PLANTS

Small space occupied, any capacity, low over-all operating costs, high and extreme efficiencies, reliability, low initial investment.
Complete power plants to meet any operating conditions of Pulp and Paper mills or other Industrial service. Engineering and Construction.
Satisfactory Services Always Guaranteed.

FERGUSON ENGINEERS
Power Specialists
Monadnock Bldg., Chicago

THE TRADE-MARK OF GOOD FELTS

The Waterbury Felt Co.
SKANEATELES FALLS, N. Y.

TRADE MARK

DRY PAPER EVENLY

STICKLE AUTOMATIC STEAM CONTROLS
DRAINAGE SYSTEMS FOR DRYERS AND HEATING SYSTEMS
CONDENSATION ECONOMIZERS FOR HEATING AIR
DEAERATING FEED WATER HEATERS, REDUCING VALVES
STEAM TRAPS, OIL AND STEAM SEPARATORS

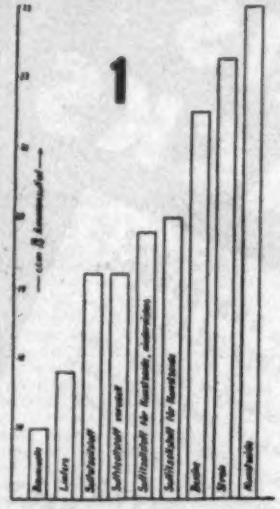
STICKLE STEAM SPECIALTIES COMPANY, 2217 VALLEY AVENUE, INDIANAPOLIS, IND.

TECHNICAL DEVELOPMENTS

The following abstracts are of the latest developments found in the foreign press.

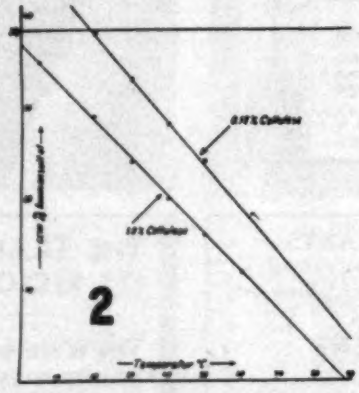
Titration of Cellulose in Cuprammonium

Cuprammonium hydroxide may be converted into the sulphate by $(NH_4)_2SO_4$ according to the following equation: $Cu(NH_3)_4(OH)_2 + (NH_4)_2SO_4 \rightarrow Cu(NH_3)_2SO_4 + 2NH_4OH$. Cellulose which is peptized by cuprammonium hydroxide is, however, insoluble in the sulphate, and the solvent action of the cuprammonium base decreases steadily as sulphate ion is added until a threshold is reached at which cellulose dispersion is no longer maintained. The cellulose cuprammonium complex decomposes with the rapid formation of cloudiness, which is quite sharply defined. This titration thus fixes the coagulation point of the cellulose in terms of a (0.05N to 0.5N) solution of ammonium sulphate. Moist blue copper hydroxide is carefully prepared according to specific directions. It is then dissolved in 25 per cent NH_4OH in absence of air, so that the solution contains 11g. Cu/liter and this may be diluted further with ammonium hydroxide.



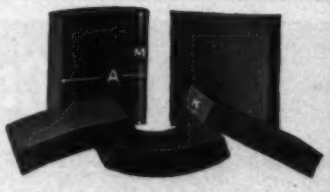
Such solutions serve as cellulose solvents, and the ammonium hydroxide titration is then carried out to the "turbidity threshold" (a). Careful studies with cotton linters and rayon show that (a) depends on the concentration of the cellulose in the initial solution. As the cellulose content increases, the $(NH_4)_2SO_4$ required for coagulation decreases. However, the slope of the curve (i.e. line) is different for linters and rayon. The turbidity (or coagulation) threshold was shown to be very different in case of celluloses of different origin—pure cotton being at the low end of the scale, while beech cellulose, straw cellulose and artificial silk cuprammonium solutions of similar concentrations are at the upper end. This is shown graphically in Fig. 1, where, reading from left to right, the height of each rectangle represents respectively the number of c.c. of $(NH_4)_2SO_4$ required to coagulate cellulose cuprammonium sols of identical concentration containing cotton linters, sulphate pulp, purified sulphite, sulphite pulp prepared for rayon (2 types), beech pulp, straw pulp, and rayon cellulose. The turbidity threshold is dependent on the concentration of copper and the temperature.

The degree of forming a copper cellulose complex is a function of the Cu. concentration. Two reaction zones are differentiated. In the case of low Cu. concentrations (up to about 3.9 grams Cu. per liter with one per cent cellulose solutions) there is an unstable equilibrium existing between a copper cellulose complex on the one hand and the cellulose and cuprammonium base on the other. As the copper concentration rises, more of the copper cellulose complex is formed. In higher copper concentrations, however, the additional copper causes a further accumulation of copper in the complex, and it is impossible to gage whether this is due to a stoichiometric salt formation or to colloidal chemical processes. The proportion of copper in the complex is definitely related to the source of the cellulose and its pretreatment. Rise in temperature causes a lowering of the solubility of cellulose in cuprammonium. A shift in the turbidity threshold of about four per cent per 10 deg. temperature change was noted. With high cellulose concentrations this change with temperature would be negligible. Fig. 2 shows the relation between the threshold (c.c. 0.1N $(NH_4)_2SO_4$) and the temperature for 10 per cent and .18 per cent cellulose solutions. Five other graphs are given. W. Kumichel. Papierfabr. 36 (Tech-Wiss. Tl) 173-8 (1938).



TANKS
TOWERS
LININGS

for Acid Storage, Processing and Pulp Bleaching



KNIGHT-WARE brick or tile linings combined with Pyroflex protected steel or concrete shells make the most durable and corrosion proof equipment available for acid work.

PYROFLEX provides a continuous leak-proof lining for steel or concrete tanks or towers. It may be applied in your plant and requires no vulcanizing. It is adaptable without a tile covering for caustic solutions and acids of a non-oxidizing character.

KNIGHT-WARE brick or tile provides a hard, smooth, acid-proof, not just resistant, lining that is clean and lasting. It will handle any acid of any strength except hydrofluoric.

Prices and further information will gladly be furnished upon specific requests.

MAURICE A. KNIGHT

KNIGHT-WARE

"IT IS THE BODY ITSELF"

Akron Ohio

Rice Straw in the Preparation of Pulp

Of all solvents, boiling water took out the largest proportion of extractives. With 95% ethanol, 26.5% of extraneous matter was removed. Rice straw stems which contained 9.6% water, 8.24% ash, 16.0% pentosans, no mannans or galactans, 8.4% lignin (which varied largely depending on the method used in its isolation), 1.74% methoxyl, and 37.5% cellulose was delignified by the use of chlorine gas and NaOH. Under the conditions of the pulping, 48% yields were obtained. Of this unbleached pulp, 75.8% was cellulose. When the same rice straw was delignified in two stages by means of 1% NaOH (first with spent liquor, and subsequently with fresh 1% NaOH at 140 deg. for 2 hours), 37.7% pulp containing 5.0% lignin was obtained. On careful bleaching, this pulp contained 88.0% cellulose and about 3.2% lignin. G. Kita, S. Nagata, and T. Kimura. Papier-Fabr. 36 (Tech-Wiss Tl.) 198-9 (1938).

Chlorine Gas in Pulping

After giving a complete history of the process, Professor Pomilio outlines in detail its special features (alkaline pretreatment, gas chlorination, alkaline washing, chlorine bleach); the chemistry of the process and its technology. In one case (an African wheat straw), using the data obtained by Cittadini, the author shows the cellulose content after the various operations. The technological features in the newest plants are (1) continuity throughout, (2) standardization of machinery and equipment, (3) digestion and chlorination towers working on the counter-current principle, (4) variable speed extractors which adjust the process to a particular raw material, (5) absence of corrosion during chlorination due to absence of mechanical equipment. In Fig. I, are given the features as practiced in the plant at Santiago (Chile) (Cf. *The Paper Industry*, Feb. 1935, p. 789).

During 1937, Cittandi, in the laboratory at Naples, subjected the following to commercial pulping experiments—wheat, oat, rye, barley, rice straw, and corn stalks, hemp and cotton stalks, bagasse (from Java, Manila, Natal, Tucuman, Cuba and Louisiana), Papua kuru-kuru, various spe-

These stream-line fittings increase the scope and efficiency of TAYLOR SPIRAL PIPE

●The most complicated piping layout can be handled in a trim, workmanlike way when these Taylor Forge light walled fittings are used with Taylor Spiral Pipe. Their stream-lined design cuts flow friction to the minimum, and their accuracy of dimension simplifies installation and effects interchangeability, saving time and dollars when pipe systems are altered or remodeled. Typical fittings and a typical use of them is illustrated above.

The strongest pipe of its weight, Taylor Spiral Pipe performs a service in paper mills that no other type of pipe can perform as well or as economically. These stream-lined fittings still further broaden its scope and efficiency.

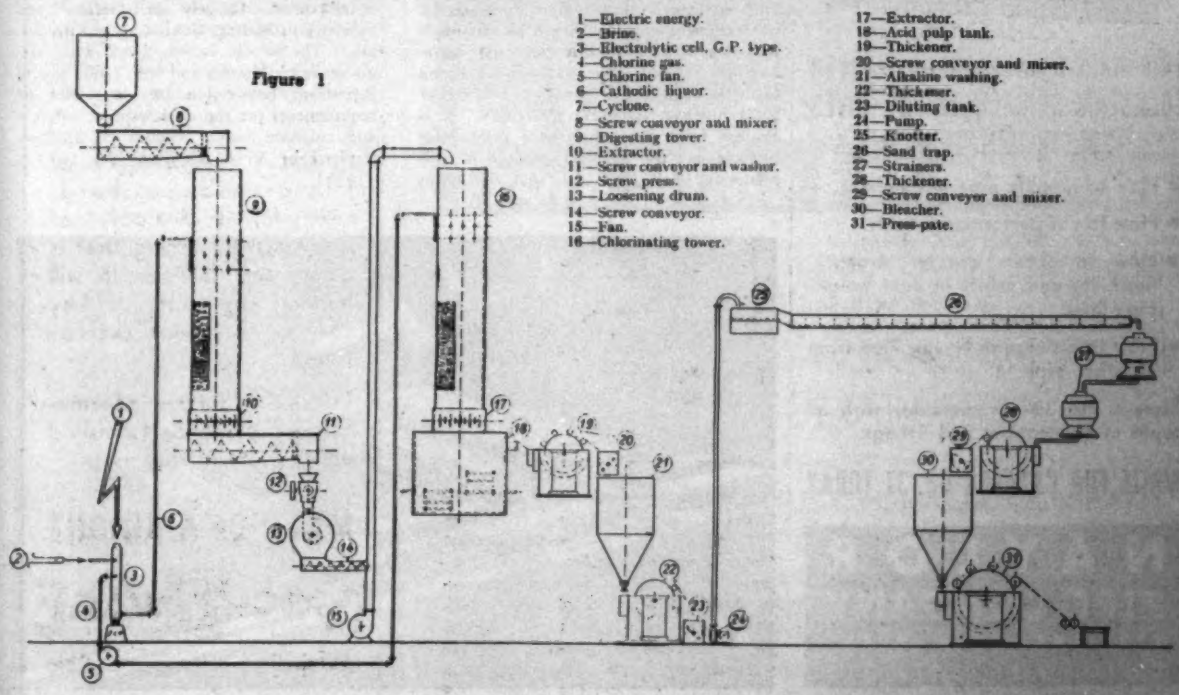
Special factory made fabrications of Taylor Spiral Pipe are as accurate as the plans furnished by the customer, and may be depended upon to fit into the pipe assembly. Ask for data covering spiral pipe, fittings and special fabrications adaptable to paper mill needs.

TAYLOR FORGE & PIPE WORKS

General Office and Works: P. O. Box 485, Chicago: New York Office: 50 Church St.

TAYLOR *Spiral* PIPE

Figure 1



1—Electric energy.
2—Brine.
3—Electrolytic cell, G.P. type.
4—Chlorine gas.
5—Chlorine fan.
6—Cathodic liquor.
7—Cyclone.
8—Screw conveyor and mixer.
9—Digesting tower.
10—Extractor.
11—Screw conveyor and washer.
12—Screw press.
13—Loosening drum.
14—Screw conveyor.
15—Fan.
16—Chlorinating tower.
17—Extractor.
18—Acid pulp tank.
19—Thickener.
20—Screw conveyor and mixer.
21—Alkaline washing.
22—Thickener.
23—Diluting tank.
24—Pump.
25—Knotter.
26—Sand trap.
27—Strainers.
28—Thickener.
29—Screw conveyor and mixer.
30—Bleacher.
31—Press-pate.

VALUABLE PIPE DATA FOR PAPER MILL OPERATORS .... *free*

THIS HANDY CATALOG ON NAYLOR LOCKSEAM SPIRALWELD PIPE GIVES YOU INFORMATION ON

- How to simplify pipe installations.
- How to cut performance costs.
- How to obtain greater strength, flexibility and safety in light weight pipe lines.
- How to distinguish Naylor Pipe from all other pipe.

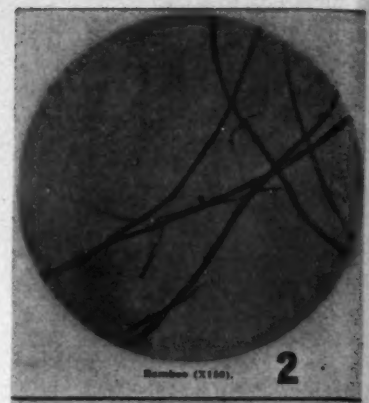
Sizes 4" to 30" in diameter with all types of connections and fittings.

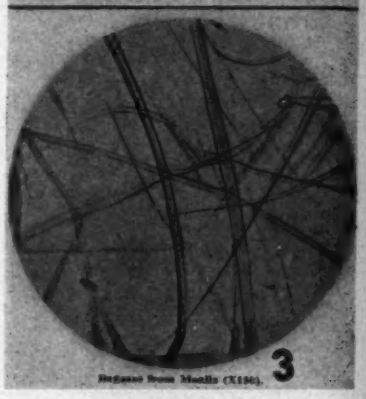
WRITE FOR CATALOG NO. 37 TODAY

NAYLOR PIPE COMPANY
1236 EAST 92nd STREET
CHICAGO ILLINOIS

cies of Brazilian capim, South African tatching and Elephant grass, various species of pine, spruce, chestnut, beech, African palm wood, broom, marsh seeds, New Zealand flax, bamboo, cotton linters, jute rags, and flax rags. In the case of about eight of these raw materials, the author gives very detailed chemical and physical properties of the pulps obtained. In most cases, he also gives the weight of salt (in kg.) and the kilowatt hours for electrolysis required to obtain 100 kg. of air dry bleached pulp. Furthermore, yield figures are given, the highest yields being obtained from New Zealand flax (71 per cent) and from cotton linters (82 per cent). The woods required the highest salt and power consumption per 100 kg. of pulp, the extreme being chestnut wood which required 99.8 kg. NaCl and 179.6 kw. hr. Cotton linters required only 9.6 kg. NaCl and 17.3 kw. hr. Fig. 2 shows a photomicrograph of bamboo (150 diam.) while Fig. 3 is one of Manila bagasse pulp obtained by the Pomilio process. Other photomicrographs are also given.

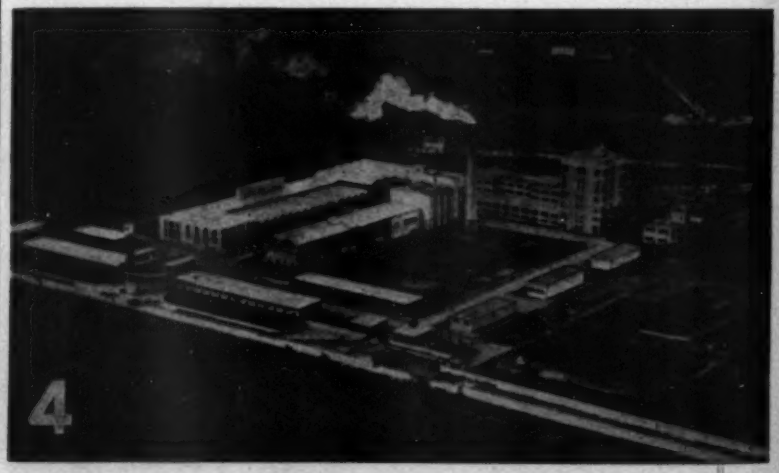
The following plants using the process are now in operation (the tonnage being given in parenthesis): (a) Rosaria De Santa Fe, Argentine (40) using largely wheat straw; (b) Santiago de Chile (24) using wheat straw; (c) Foggia, Italy (cf. Fig. 4 giving a general view of the plant) (40) using wheat straw. Of these, the capacity (a) and (c) are being increased. Plants under construction are at (d) Naples, Italy, (e) Springs, Transvaal, (f) Montevideo, Uraguay and (g) Facture, France. In these new plants, the total combined daily output, however, will only be 102 tons of (bleached pulp). The author takes exception to the statement of Dr. J. S. Bates that it is difficult to obtain straw with sufficiently long fibers at a moderate cost. Pomilio claims that in many countries the cost of manufacturing straw pulp is actually lower than that of the production of wood pulp. A plea is made that the British Empire use its "inexhaustible fibrous raw materials" pulping them by the Pomilio process. The author gives nineteen literature references. It is evident from the article that present-day tonnage by the Pomilio process is still relatively small, and also that the pulps will serve the paper rather than the rayon industry. Umberto Pomilio. Paper-Maker and British Paper Trade J. 95, No. 5 (T. S.) 67-80 (1938).





Air Conditioning in the Pulp and Paper Industry

This is an excellent resumé of technical developments (largely in Finland and Sweden) in heating, ventilating and insulating. The article is illustrated with diagrams and half-tones and with tables giving the steam power (in kw. hr.) and air requirements per ton of newsprint, sulphite and sulphate pulp. Harald A. Erikson. Papier-Fabr 36 (Tech-Wiss. Tl) 165-172 (1938).



FORESTRY

CONSERVATION NEW WAY OF THINKING

"What is conservation? Everybody has an idea about it because the word is in such general use. Few persons go much further than the definition given in the dictionary—many not that far—and have never considered the broad application of the word as it is used by foresters and specialists in other fields," says the New York State College of Forestry at Syracuse University.

In explaining conservation, some authorities state that it is not a subject, but a method of living; others say that it must be considered as an activity, or an attitude toward thrift; still others, that it is a new way of thinking of which the American people are in great need.

Conservation does not mean just to preserve, or to protect, or to nurture. It does, however, carry those ideas. It is definitely opposed to destruction, extravagance and neglect. Conservation is nothing temporary or occasional. It must be continuous and constructive and profitable. In this sense, conservation should influence our daily lives and everything we do because in the last analysis, and in using the word in its broadest sense, it means doing the right thing all of the time, says the college. So conservation applies to our individual habits at home, in the office, and in public places like the forests and fields and on the waterways.

According to the New York State College of Forestry, conservation means wise use of time, funds, material, health and natural resources, such as the forests, the soils and wild life, the use that, under all the circumstances, obtains the best possible in the interest of society.

◆

AWARD FORESTRY SCHOLARSHIPS TO CAN. YOUTH

So that young men may be interested in forestry development in the regions in which Price Brothers, Ltd., Quebec, carry on business, C. H. L. Jones, president of that company, recently instituted scholarships at the college of Chicoutimi, Ste. Anne de la Pocatiere and Rimouski. The company is the pioneer in this province in this industry.

Jean Brassard was awarded first prize at the Chicoutimi College. At Ste. Anne de la Pocatiere College, Leon Philippe Langelier won first prize, and Gabriel Belzile won highest honors at the Rimouski College.

The winners wrote essays on the history of the development of forests in the Province of Quebec, on lumberjacks of olden days and of today, on life in the shanties and the place of the forests in the economic life of the Province, and on the relation between the forests and agriculture. The judges were Avila Bedard, Deputy Minister of Lands and Forests; Jean Bruchesi, Assistant Provincial Secretary, and Esdras Minville of the School of Higher Commercial Studies, Montreal.

◆

START NATURE CAMP PROGRAM

The nature educational program inaugurated in 1935 at Fish Creek Pond's Public Camp in the Adirondacks by the New York State College of Forestry, and the State Conservation Department, will be continued this year. Marvin E. Wilson, who has directed the program for the past two seasons, will be in charge this year. This announcement was made by Gurth A. Whipple, Director of the Extension Department at the college.

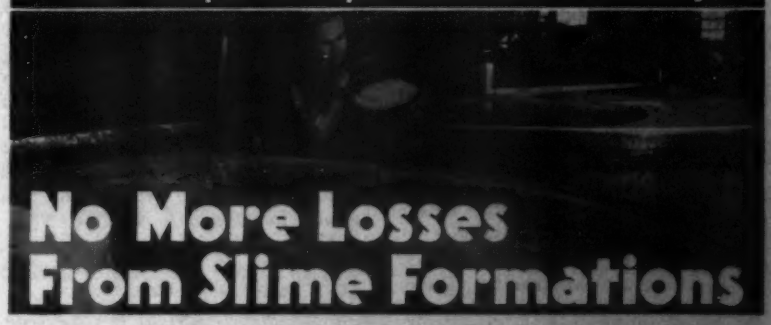
Opening July 4 and continuing until September 5, the program includes the operation of a nature lodge, exhibiting wild-life specimens typical of the region; and evening lectures given in a large, open-air amphitheater at the camp. These popular lectures on nature and conservation will be illustrated by colored lantern slides and motion pictures.

An educational device which has proved very popular at the camp is a "self-guiding" nature trail. Hikers, by means of popularly written labels, can interpret the natural features along the way. In addition, there will be conducted nature walks, short and easy enough for young and old. Because of their popularity last season, the number of these conducted walks will be increased.

A mimeographed bulletin will be distributed weekly among the campers announcing the scheduled features.

This year, as last, arrangements will be made to extend the program to Lake Eaton Public Camp where weekly camp-fire talks will be featured.

How To Operate Paper Mills More Profitably



No More Losses From Slime Formations

Fungus and bacteria growths must be killed to prevent slime formation in paper mill machinery, pipe lines, etc. In addition, slime spots, breaks, poor quality stock and many other difficulties as well as losses, present themselves when slime is present in the system.

MAGNUS SLIME REMOVER

is the only practical agent that completely disintegrates slime growths, loosening and dissolving them for easy riddance by simply flushing the system. This simple method does away with expensive, time-wasting methods, and eliminates costly scraping, taking apart of machinery, piping, etc.

MAGNUS SLIME REMOVER also retards slime growths by preventing them from getting a foothold, thereby greatly reducing the frequency of cleaning operations. Divorce yourself from slime nuisance. All that you need to do is: 1—Add MAGNUS SLIME REMOVER to the beater; 2—Pump through the system.

FREE—Handbook of Paper Mill Cleaning Operations. Send for your FREE copy TODAY.

MAGNUS CHEMICAL COMPANY

Manufacturers of Cleaning Materials, Industrial Soaps, Metallic Soaps, Sulfonated Oils, Emulsifying Agents and Metal Working Lubricants

192 South Avenue Garwood, N. J.

MAGNUS CLEANERS

OTHER COUNTRIES

ITALIAN NEWS

Cellulose Experiment

In order to determine the value of cellulose obtained from ordinary marsh canes *(arunda donax)*, an industrial experiment was held recently at the "Cartiere Meridionali di Isola del Liri," Italian paper mill. A yield of about 40 per cent in bleached cellulose was obtained, the bleaching process using about 7 to 8 kilos of chlorine. The fibers of this cellulose, as observed under the microscope, delignified and gave a violet-blue tint with the chlorine iodide of zinc reagent. The fibers' dimensions varied from 1 millimeter to 2.5-2.7 millimeters. Non-fibrous elements were numerous although in a smaller quantity than in straw cellulose, it was reported.

Book Museum

Through the Minister of National Education and because of the efforts of students and authorities, there has been recently organized in Rome, an institute devoted to books. Included in the features at the institute are biological laboratories, chemical laboratory, physics laboratory and exhibits of the ultra violet rays of which show their importance in connection with books and paper. Of special interest was the reconstructed 14th century papermill and the various exhibits of old books and writing instruments.

Markets

The Italian paper market was fairly lively during the last month. There was an increased demand for newsprint and writing paper while packing paper had a good absorption with the commercial firms. Cellulose producers booked considerably more orders and general importations continued on the usual scale as the consumption of raw materials tended to increase in the paper, rayon and certain other industries.

East African Wood

In several regions of Italian East Africa there are available several rich wood and bamboo growths, which will permit abundant supplies of cellulose-producing wood for Italian mills. Some of this wood is to be absorbed on the spot and some is to be exported to Italy, it is reported.

▸▸▸ IT HAS BEEN RECENTLY ANNOUNCED that the new paper mill which is to be established at Letjes, East Java, will not be brought into operation before the end of 1939 due to difficulties which have arisen in placing orders abroad for the delivery of machinery.

◆

MORE EXHIBITORS AT LEIPZIG FAIR

Exhibitors of books and paper goods at the Leipzig (Germany) Spring Fair numbered 394, occupying a display space of 4,914 square yards as compared with 374 exhibitors and display space of 4,927 square yards at the 1937 Fair. Of the total number of exhibits, about 300 were exclusively of paper products, comprising principally stationery, picture postcards, color prints, printed reproductions of paintings, packing materials, paper for decorative purposes, chiefly for show windows and fancy packages.

Although the variety of exhibits of paper goods was very extensive, they included relatively few innovations, most of them being decorative paper for packing purposes. Particularly noteworthy were papers imitating very closely textile materials, such as plush, velours and silk brocades in various vivid colors. The use of cellglass, which is said to be somewhat similar to Cellophane, for containers and receptacles of many kinds, has greatly increased.

The 1,980th session of the Leipzig Trade Fair will be held from August 28 to September 1 inclusive.

◆

POLISH PAPER BUREAU FORMED

According to a recent issue of *The Paper-Maker and British Paper Trade Journal*, a joint sales bureau for packing papers was formed in Warsaw, Poland, early this spring with the cooperation of nine mills producing this grade of paper. It is proposed to regulate the production and sales and promote the export trade. The production of all kinds of paper in Poland in the first quarter of 1938 amounted to 29,900 tons as compared with 31,000 tons in the same period of 1936. The reduction is, however, merely a transitory event, it is considered.

BRITISH NOTES

State of Trade

There are few signs of any real improvement in trade although towards the end of June inquiries were more numerous and it was seen that stocks were being called upon more freely. A belief is current that we have nearly seen the end of the present depression. It is hoped that as a consequence of the lack of buying over the past few months the autumn season will start a little earlier this year and from September trade will become more normal.

Lord Portal

At the annual general meeting of Wiggins Teape and Company, the chairman, Lord Portal D.S.O., M.V.O., said, in connection with the trade agreements with Scandinavia, that he must "emphasize that instead of the British firms being allowed to be the advisers in the policy of these cartels, which anyone would consider to be the natural course to be pursued in our own markets, these cartels are governed from Scandinavia, and we have to follow humbly in their footsteps. This is a Gilbertian situation which cannot be allowed to continue unless one wishes to see the whole of the paper trade in this country sink into a worse position than that of 1930." Lord Portal was again directing attention to the fact that whereas on the one hand the Scandinavians fix a high price for their wood pulp, their own papermaking mills undercut the British maker in the latter's market. This is very keenly felt by the British makers who are faced with the unfortunate position of cutting their prices to meet this Scandinavian undercutting while they are still making paper from materials purchased from that country at an extremely high price.

PATRA Report

The experiment of having one association for the printing and kindred trades, under the title of the "Printing and Allied Trades Research Association," is proving a considerable success, according to the annual report. This association is helped by the Government with a financial grant providing the members contribute a certain sum each year. During the past year, 712 inquiries have been made out of which 118 directly concerned paper.

As a result of these, attempts have been made to devise adequate means of measuring gloss, opacity and colour of paper, also its smoothness, ink receptivity, etc. A further instrument has been devised to measure the relative expansion and contraction of paper under varying conditions of humidity. Tarnishing of bronze prints and imitation gold leaf through reducible sulphur in paper has been attacked and the interference of hardened casein with lithographic work has been suspected.

Phone Directories

Through a visit of a party of journalists to His Majesty's Stationery Office at Harrow, some light was thrown on the enormous amount of work entailed in compiling and printing the ever growing telephone directories for Great Britain. The London section, which is by far the largest, is issued in two parts, twice a year, and within seventeen years the tonnage of paper required has increased from 772 to 7,583 tons. Added to this, London has a classified directory needing 855 tons and the provinces, taking a series of directories, add a further 2,227 tons, making a grand total of over 10,000 tons. It is printed on an inexpensive newsprint quality.

Imports and Exports

May returns disclose a heavy decline in the importations of manufactured paper and boards. This with previous month's declines represents a fall of over 60,000 tons so far this year. It was noted that the decline was particularly heavy among packings and wrappings despite Scandinavian mills reducing their prices considerably in order to capture more trade. British exports of paper and boards to date are over 3,000 tons lower than for the first five months of 1937, but the imports of papermaking materials declined during May, for the first time this year. These still disclose a credit balance of 66,000 tons. The first arrivals for several months of esparto grass from Spain (1,200 tons), owing to the war are also reported.

New Mill for India

Plans are now being formulated for the erection of a pulp and paper mill in Hyderabad, India, according to a report found in the Interim issue of the British *Paper Maker*. It is expected that the plant will be designed for an annual output of five to six thousand tons. The project is to cost approximately £375,000.

According to the report the prospects of the industry have been carefully investigated by the Government and it is considered that a fair profit should be obtained, even under severe competition, due to the fact that two of the main raw materials, bamboo and coal, are found close to the selected site of the plant.

Further Agreements

Following the recent agreement by the art mills to reduce their production for a certain number of hours over a given period, the mills making wood-free papers have also agreed to cut down their hours by twelve per week for nine weeks. Apart from these agreements, some of the mills are closing for occasional weeks on their own initiative.

Newsprint Prices

It is generally expected on this side that the prices for newsprint will not be advanced during 1939. As regards other papers every effort is still being made to hold against declines although banks and bonds declined recently by an average of £2-6-8 per ton and M. G. Posters by £3-10-0. Coated papers have also been subjected to "adjustments."

Mill Reports Record Year

Albert E. Reed and Company, disclose, with the year ending March 31st, an increase in profits of £50,000 on a total of £282,755. Increase is due to record output on higher prices. The future is, however, considered to be less satisfactory as Reed's make large quantities of wrappings, the prices of which have declined heavily within recent weeks.

Air Mail Paper

One field in the British paper trade in which sales are forging steadily ahead is that of lightweight papers used for the air mail, according to a recent item in the *Worlds Paper Trade Review*. During the first three months of 1938, it is alleged that over 200 tons of air mail were dispatched ffom and received at Southampton over the empire routes.

▶▶▶ NEW ZEALAND imports approximately 2,000 long tons of kraft board annually, principally from the United States and Canada, it was reported recently.

▶▶▶ AUSTRALIA PRODUCED approximately 85,000 long tons (long ton equal to 2,240 pounds) of paper and board during 1937, all of which was manufactured from imported pulp.

PULP
BLEACHING
COMPANY

ORANGE
NEW JERSEY

CELLULOSE
PURIFICATION

▶▶▶ POMILIO CORPORATION, LTD., has just been registered in England with a nominal capital of £100,000, it was revealed. This organization move took place shortly after Professor Pomilio's recent address on the use of chlorine gas in papermaking (cf. *Paper World*, p. 45, May 1938).

◆

NO DUTY ON MACHINERY FOR PERUVIAN MILL

There will be no customs duties on machinery and materials to be imported by the Sociedad Agricola Paramonga, to be used in the new paper plant to be erected by this company at Paramonga, Peru (cf. *Paper World*, p. 43, March 1938). The duty-free entry was granted by the Peruvian Government to encourage and support the establishment of a new industry in Peru which will use native Peruvian products as raw materials. Bagasse of sugar cane is to be the principal base of the paper to be manufactured and studies are now being made with the purpose of eventually producing all kinds of paper, with the exception of newsprint. Actual production will probably not begin until 1940.

POTPOURRI

DOUBLE TROUBLE FOR MR. COOPER

Lightning may not strike twice in the same place but evidently logging accidents are no respecters of this rule . . . at least not if Ray Cooper, logging camp employee of the Washington Pulp and Paper Company at Neah Bay, Wash., is any authority on the subject.

For the second time within a year Cooper sustained a broken leg in a woods accident and also for the second time, he was flown by Coast Guard plane from Neah Bay to Port Angeles, 70 miles distant, for hospitalization. The same leg was broken on both occasions.

● Many installations of Cleveland Tramrail roll handling equipment have been made in paper and paper products plants.

● This is a one ton job—hand propelled transfer bridge and carrier with motor operated push button controlled hoist and grab.

Consult your phone directory under Cleveland Tramrail.

CLEVELAND TRAMRAIL

Division of

THE CLEVELAND CRANE & ENGINEERING CO.

1165 Depot St.

WICKLIFFE, OHIO

▶▶▶ *S. F. Shattuck,* vice-president of Kimberly-Clark Corporation, Neenah, Wisconsin, has purchased an A boat, the largest type of racing sailboat, which will take part in the Inland Lakes Yachting Association regatta in August. Mr. Shattuck's boat is now taking part in the weekly races on Lake Winnebago. Vice-president *C. H. Sage,* of Kimberly-Clark, another yachting enthusiast, has purchased an E boat.

◆

HONORARY DEGREE FOR W. STEELE

Centenary College, Shreveport, Louisiana, recently awarded an honorary degree of doctor of laws to Westbrook Steele, executive director of the Institute of Paper Chemistry at Appleton, Wisconsin. Mr. Steele had served as vice-president of Centenary in 1924 and 1925 and was one of the two to be thus honored by the college. Dr. Steele had a prominent part in the founding of the Institute of Paper Chemistry and has been connected with it ever since. He is widely known among executives of paper mills and allied industries throughout the United States.

◆

▶▶▶ *John C. Tongren,* research chemist at the Hammermill Paper Company, Erie, Pa., and Miss Alice Jeanette Jones of Menasha, Wisconsin, were married June 11 in Appleton, Wisconsin.

◆

▶▶▶ Married June 18 were *Robert Rausch,* associated with the International Paper Company, Glens Falls, N. Y., and Miss Mary Mortimer, in Appleton, Wisconsin.

◆

MILL MEN WIN AT MERCHANTS ASS'N OUTING

Paper manufacturers took away a good share of the prizes at the annual outing of the New England Paper Merchants Association at the Rhode Island Country Club on May 16. Low net was won by H. Fowler of International Paper Company for which he was awarded a handsome pigskin traveling set.

Other mill men at the affair included Karl Ways, Nashua Gummed and Coated Paper Company; W. A. Bruckhauser, Agar Manufacturing Company; A. R. Cox, Union Bag and Paper Corporation; L. Claflin, Erving Paper Mills; J. Levis, Munroe Paper Corporation, and E. E. Ketcham of International Paper Company.

Close-ups

OXFORD-MIAMI'S MUSICAL HUNTER

Don Hunter, personnel director of the Oxford-Miami Paper Company, West Carrollton, Ohio, paraphrases a well-known song "Give a Man a Horse he can ride," into his own version "Give a crowd a piano and me."

Don considers music something more than just a hobby. His musical career started "way back when" his mother used to call him back into the house with "Now, Don, you've got to practice your piece before you can go out to play."

At one time, an orchestra in Dayton gained considerable popularity. Only by inquiring, did one learn that the modest, slender, young piano player was Don Hunter, owner and director of the orchestra.

However, Don Hunter, the business man, became so absorbed with his work as personnel director at the Oxford-Miami Paper Company that there was less and less time for orchestra work and he now uses his musical talents for the amusement of a few close friends. While he obliges dancers with popular tunes, Don is the true musician and loves the classics.

Don admits a liking for a friendly game of poker, but from what he says at times, one would think he has a lot to learn about the game, inasmuch as he frequently finds himself "stuck" for the refreshments, which honor goes to the worst loser.

One of Don's greatest concerns is the subject of safety. He was the first manager of the Dayton Safety Council back in 1928 BFC (before financial crash). For two years he served as chairman of the Pulp and Paper Section of the All-Ohio Safety Congress and he has participated in many of the programs of the Pulp and Paper Section of the National Safety Congress.

27 years of satisfactory service

Chicago's Largest and Most Complete Stock ELECTRIC POWER EQUIPMENT
Save 50% or more on Guaranteed Rebuilt Equipment
MOTORS — Synchronous, Slip-Ring, DC Variable Speed, Etc.
Frequency Changers Engine Gen. Sets Steam Turb. Gen. Sets
Generators Pumps Compressors
CHICAGO ELECTRIC COMPANY
1324 W. 22nd St. *Write for Catalog* Chicago, Ill.

COMING EVENTS

Sept. 5-9—American Chemical Society Meeting, Milwaukee, Wis.
Sept. 8-10—Technical Association of the Pulp and Paper Industry, Fall Meeting, Northland Hotel, Green Bay, Wis.
Sept. 19-23—7th International Management Congress, Washington, D. C.
Sept. 21-23—National Industrial Adertisers Association, General Conference, Statler Hotel, Cleveland, Ohio.
Oct. 10-14—National Safety Congress, Stevens Hotel, Chicago, Ill.

J. W. HEWITT MACHINE CO., Inc.
Neenah, Wisconsin
Builders of
Paper Making Rolls and Special Machinery
Roll Grinding a Specialty

WIENER REFINERS
STOCK REGULATING VALVES
ENGINEERING AND DEVELOPING
WIENER REFINER ENGINEERING CO.
OSWEGO, NEW YORK

"READY DRESSED" **MILL COGS**
LABOR SAVING—TIME SAVING

THE MOST ECONOMICAL FILLING THAT CAN BE PUT IN A MORTISE WHEEL

WE MAKE ANY STYLE OR SIZE WANTED
WRITE FOR INSTRUCTION SHEET "G" WHICH IS FREE

QUICK SERVICE ON ALL SIZES
THE N. P. BOWSHER CO., South Bend, Ind.

THE RECORD "INDEPENDENCE" WIRE CABLE PULP WOOD CONVEYOR SPROCKETS FOR UNLOADING AND STORAGE SYSTEMS

These sprockets have CONTINUOUS FLARING RIMS, machined grooves and are provided with REPLACEABLE WEARING SHOES. The FLARING RIMS are a most valuable feature, since should buttons lose spacing from any cause and ride—"WIRE CAN'T COME OFF."

Two wearing shoes are securely locked in dove tail sockets each pocket.

Easily "REPLACEABLE STEEL CABLE GROOVE SHOES" may be furnished to order,—a most economical feature.

Illustrated is a sprocket having pockets pitched at one-half the cable button spacing, permitting use of less costly sprockets and gearing where 4 foot wood is conveyed.

Manufactured by
RECORD FOUNDRY & MACHINE COMPANY
LIVERMORE FALLS, MAINE, U. S. A.

PERSONALS

L. C. SMITH NOW PERSONNEL HEAD AT THILMANY CO.

Recently appointed personnel director of the Thilmany Pulp and Paper Company, Kaukauna, Wisconsin, is L. C. Smith who succeeds to the post recently vacated by W. F. Ashe, now

L. C. Smith

director of the new Wisconsin State Department of Commerce. Mr. Smith had been associated with C. R. Meyer and Sons Company of Oshkosh, Wisconsin, which firm built many structures for Fox Valley paper mills.

◆

HOWE CELEBRATES FIFTIETH YEAR IN PAPER FIELD

Celebrating his fiftieth anniversary as a paper manufacturer and paper merchant, William H. Howe, well known throughout the United States and Canada, was honored by friends and associates at a luncheon tendered him recently at St. Catherines, Ontario.

William H. Howe was born in Hamilton, New York, in 1870, the son of Henry H. Howe and Mary Angel Howe. When 18 years old Mr. Howe started in the wholesale paper business in New York City with the late Charles F. Hubbs, his brother-in-law. After learning the business, sales led him west and visualizing the possibilities of expansion, wholesale paper houses were started in Buffalo, Cleveland, Rochester and Pittsburgh.

The paper manufacturing business then attracted Mr. Howe and a small mill was acquired at St. Catherines, Ontario. This mill is now the sole manufacturer of vegetable parchment in Canada and has a modern waxing and printing plant in addition to a large converting plant.

The Mumford Paper Mills, Mumford, N. Y., were acquired later and for 32 years this mill has progressed and is one of the most complete and up-to-date paper mills of its type.

Mr. Howe has served in an advisory capacity for many well known paper concerns and for many years he was connected with the Niagara Wall Paper Company, and the Hammermill Paper Company.

Mr. Howe is a director of all of the following companies and holds the following offices in them: President and treasurer, Hubbs & Howe Company; president, Anglo-American Paper Company, having as its subsidiaries the Victoria Paper & Twine Co., Ltd.; the Garden City Paper Mills, St. Catherines, Ontario; The Canadian Vegetable Parchment mill and converting plant and the Mumford Paper Mills, Mumford, N. Y. He is also vice-president of the Hubbs & Hastings Paper Company and the Interstate Cordage & Paper Company.

Francis W. Howe, his son, has been associated with the various companies for the past ten years and is also a director of the Anglo-American firm and Mumford Mills in addition to being secretary of Hubbs & Howe Company of Cleveland and Buffalo.

Mr. W. H. Howe has been interested in motor yachting for many years having had two of the finest crafts in the Buffalo area. The center of attraction now, however, is a Boxer dog, "Christopher," who is the constant companion of his master.

William H. Howe

◆

▶▶▶ In charge of the new southern sales office of the Power Piping Division of Blaw-Knox Company, Pittsburgh, Pa., is *O'Earl Kearney*, who has had extensive experience in the

O'Earl Kearney

power plant and industrial piping fields during the past twenty years. The new office is located in the Candler Bldg., Atlanta, Georgia. Blaw-Knox has also announced the appointment of *William P. Favorite* as district representative for Power Piping Division, and *H. W. Greenberg* as sales manager of its Sprinkler Division.

◆

GULICK HEADS BOARD OF NAT'L OIL PRODUCTS

Charles P. Gulick, founder and former president of National Oil Products Company, Harrison, New Jersey, chemical manufacturers, today announced that at the June meeting of the Board of Directors he was elected to the newly created office of Chairman of the Board.

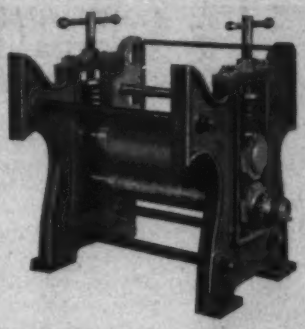
John H. Barton, previously vice-president, was elected president, and Thomas A. Printon, former general sales manager of the Industrial Division, was elected vice-president in charge of industrial sales.

Long, perfect cutting between grinds

MICRO GROUND

The Coes line is complete, including many forms of special knives made to meet individual requirements.

LORING COES COMPANY
WORCESTER, MASS.



Small embosser for light work. May be used with bag machine for embossing Glassine or cellophane.

EMBOSSERS

Hudson-Sharp embossers may be secured for any purpose including process of papers, boards and other products lending themselves to the embossing process. State your embossing problem and we will recommend an embosser to solve it.

•

Hudson-Sharp Machine Co.
Green Bay, Wis.

"NON-USERS ARE THE LOSERS"

TENAX FELTS

FINISH AND SPEED

"*And* TENAX FELTS"

As new mills swing into production and their equipment lists are published, time and time again we are gratified to find TENAX FELTS chosen to carry their share of the load. Their satisfactory record is our inspiration for the present and the future.

"Non-Users Are The Losers"

LOCKPORT FELT COMPANY
Newfane, N. Y. — U. S. A.

Charles P. Gulick

Other officers of the company are: Perc S. Brown, vice-president; G. Daniel Davis, vice-president; Ralph Wechsler, treasurer, and Albert A. Vetter, secretary.

Mr. Gulick stated that the company had recently expanded its plant facilities at Harrison, Chicago, and Cedartown, Ga., and is preparing for a substantial increase in its general business, which consists of various types of chemical products, such as processing materials used in basic industries, as well as a line of essential vitamin concentrates and allied products for the feed, food and pharmaceutical industries.

CODY RESIGNS FROM GAYLORD CONTAINER CORP.

Recently resigned as vice-president and general manager of the Gaylord Container Corporation of Bogalusa, Louisiana, is M. E. Cody, widely-known executive in the paper field.

Mr. Cody also resigned from the executive committee and the board of directors of the company. Vertrees Young, executive vice-president, has taken over Mr. Cody's duties until a new general manager is appointed.

◆

▸▸▸ *Walter Barker,* president of the Improved Paper Machinery Corporation, Nashua, New Hampshire, and widely-known throughout the paper and pulp field, was married on June 28 to Miss Irene Hyman. The ceremony took place at Nashua.

◆

C. V. ALLEN RETIRES FROM WESTINGHOUSE

Forty-five years associated with the Westinghouse Electric and Manufacturing Company, Charles V. Allen, treasurer of the company, has retired.

Mr. Allen joined the Westinghouse firm in 1893 after graduating from the Massachusetts Institute of Technology and started work as an apprentice engineer. After a very short apprenticeship, he took over the transformer tests and later the detail tests at East Pittsburgh.

Charles V. Allen

In 1900 Mr. Allen joined the Foreign Department of the company which department later became the Westinghouse International Company. Mr. Allen came to New York City in 1903 as sales engineer with the export department and in 1905 he went to Mexico where he ultimately remained twenty years. In 1921 when the company's branch in Mexico was opened, Mr. Allen became manager.

In 1925 Mr. Allen returned to New York as assistant treasurer and in the same year was elected treasurer.

NECROLOGY

A. J. MARCUSE

Alexander J. Marcuse, president of the General Paper Company, and treasurer of the Bedford Pulp and Paper Company of Richmond, Va., passed away Thursday, June 30, at his home in New York. He was 73 years of age, and in addition to his paper company interests, in which he was associated with his brothers, Isaac J., Milton E., and Moses M. Marcuse, all of Richmond, he was vice-president of the West Disinfectant Company of Long Island City, N. Y., treasurer of the Hydro-Electric Company of Virginia, and of the Bedford Land and Timber Company. Mr. Marcuse was born in New York, but moved with his family to Virginia, later returning to New York as the Atlantic district sales manager for the American Can Company, going to the West Company in 1912.

◆

WILLARD N. MUNROE

A prime factor in the development of several leading paper manufacturing units of New England and Canada, Willard N. Munroe, president and treasurer of the Groveton Paper Company, Groveton, N. H., passed away June 16 at the age of 78.

His first venture in papermaking was in 1898 when he acquired the Odell Manufacturing Company of Groveton, manufacturers of wrapping papers. In 1900 he helped found the Brompton Pulp and Paper Company of Quebec, an enterprise in which he had as associates, Charles Wilson of Auburn, Maine; C. W. Twitchell of Berlin, N. H.; E. W. Tobin of Sherbrooke, Quebec; E. P. Lindsay of Boston; Horace Munroe, his brother, and later George Van Dyck, timber king of the Connecticut Valley. Mr. Munroe was treasurer. The Brompton firm later acquired the Odell company.

Mr. Munroe figured prominently in the development of the Canadian company, but in 1937 the Groveton Company was bought back from the Brompton concern and he gave his time to the management of the New Hampshire firm. He is survived by his widow, a son and a daughter.

◆

EDWARD E. O'KEEFE

One of the pioneer builders of paper mills in Wisconsin, Edward E. O'Keefe, passed away recently at his home in Appleton, Wisconsin, after an illness of several months. He was 83 years of age.

Born in 1855 at Green Bay, Wisconsin, Mr. O'Keefe attended Law-

MISCO "C" is recommended for:

Digester neck rings • Digester bottom sleeves • Blow-off valves • Acid valves • Acid pumps • Digester heads • Bottom crosses • Strainers • Fittings • Piping • and all other equipment exposed to corrosion by sulphite acids.

MISCO "C" "Centricast"* ACID and RELIEF PIPING

During the past four years many producers of sulphite pulp have adopted Misco "C" "Centricast" pipe for all acid and relief lines thus assuring corrosion free operation.

*Trade Name Registered

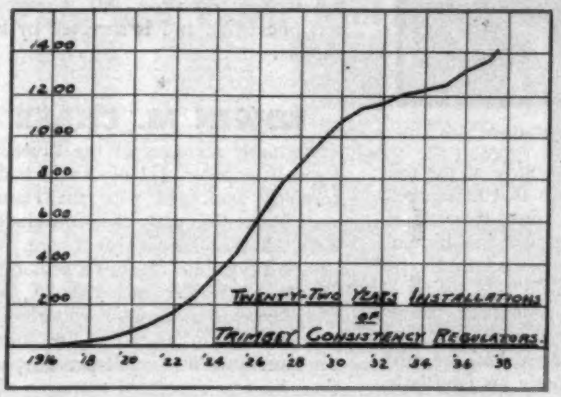
BULLETIN "C"-3

Twelve page illustrated bulletin containing prices and information on Misco "Centricast" pipe and tubes will be sent on request.

MISCO
Heat and Corrosion Resistant Alloys

Member Alloy Casting Research Institute, Inc.

MICHIGAN STEEL CASTING COMPANY
One of the World's Pioneer Producers of Chromium-Nickel Alloys
1992 GUOIN STREET, DETROIT, MICHIGAN



After TWENTY-TWO Years:-- and More Than 1400 INSTALLATIONS

A New

TRIMBEY CONSISTENCY REGULATOR

IS SOLD EVERY

FIVE DAYS!

Draw Your Own Conclusions

We also Manufacture

KNOTTERS
PULP SCREENS
FLOAT VALVES
METERING SYSTEMS

TRIMBEY MACHINE WORKS

Glens Falls, N. Y.

Also "Made in Canada"

rence College at Appleton and in 1882 became associated with the late Thomas W. Orbison in the engineering firm of O'Keefe and Orbison, which company designed and built the original mill of the Interlake Pulp and Paper Company Division of the Consolidated Water Power and Paper Company at Appleton, the Thilmany Pulp and Paper Company and the Union Bag and Paper Company mills at Kaukauna, Wisconsin, the Combined Locks Paper Company mills at Combined Locks and many others. The company was a leading consultant on hydroelectric and hydraulic projects and operated in this capacity from Maine to Wisconsin.

Mr. O'Keefe, who is survived by one daughter and four sons, supervised the construction of the world's first hydroelectric plant at Appleton, a small generating plant, a replica of which stands today on the grounds of the Wisconsin Michigan Power Company.

◆

▸▸▸ Founder of the Merrick Scale Manufacturing Company, Passaic, New Jersey, *Herbert L. Merrick* passed away recently after a prolonged illness. Mr. Merrick founded the scale concern thirty years ago.

◆

GEORGE E. EMMONS

Formerly manager of the Schenectady Works of the General Electric Company and later vice-president in charge of manufacturing for the company, George E. Emmons, 80, passed away July 1 in Pasadena, California.

Mr. Emmons had devoted more than a quarter century directing the development of one of the world's biggest electrical plants as general manager. Having been continuously engaged in the electrical business since 1886, Mr. Emmons was one of the pioneers in the electrical industry; he was actively engaged in the management and development of the manufacturing department of the General Electric Company for 30 years and continuously engaged in the electrical business for nearly 40 years. He was made vice-president in 1916.

◆

CARL S. HAMERSLEY

President of the Hamersley Manufacturing Company, Garfield, N. J., since 1896, Carl S. Hamersley passed away June 6 at the age of 65.

Mr. Hamersley was born in Jersey City, a son of the late Siegfried Hamersley, inventor of a process for making waxed paper by machinery and founder of the company. He was a graduate of Stevens Institute in 1893 and had been president of the Hamersley firm since his father's death in 1896.

Mr. Hamersley belonged to several organizations of paper manufacturers and merchants and also the Engineers Club of New York and the Hollywood Athletic Club of California.

◆

DOUGLAS MALLOCH

Known far and wide as "the poet who makes living a joy," Douglas R. Malloch passed away suddenly on July 2 in Muskegon, Michigan, his summer home. He was 61 years of age.

Mr. Malloch was born in Muskegon in 1877 and started work with the

Douglas R. Malloch

Muskegon Daily Chronicle at the age of 11, remaining with that newspaper until 1903 when he joined the staff of the *American Lumberman* in Chicago, of which at the time of his death, he was associate editor.

Mr. Malloch's philosophical poetry appeared in many magazines and was read in the newspapers daily by millions of people. Among his familiarly known poems are the widely-quoted "Today" and the titular poem of his inspirational book, "Be The Best of Whatever You Are." His latest books are "Come on Home," "Live Life Today," and "The Heart Content."

Mr. Malloch was also popular as an after-dinner speaker and lecturer at many association and sales meetings throughout the industry, his serio-humorous comments and original maxims providing pertinent side-lights to the ethical side of business and business methods. In this vein Mr. Malloch once wrote: "Slamming your competitor is like slamming a punching bag . . . if anybody gets hit on the nose it will be you." Typical also of the poet-philosopher were his views on co-operation in business, one of which was: "If you don't think co-operation is necessary observe what happens to a wagon when one wheel comes off."

Mr. Malloch was a member of the Press Club of Chicago, formerly being president of that organization; Council of the Authors' Guild of the Authors' League of America and an honorary member of the Forty Club, which is to Chicago what the Gridiron Club is to Washington. Mr. Malloch was also a member and co-founder of the Society of Midland Authors which organization embraced such authors as, Hamlin Garland, the late Emerson Hough, Edna Ferber, James Whitcomb Riley. Surviving Mr. Malloch are his widow, a son and three daughters.

◆

J. CAMPBELL

In charge of advertising and sales promotional work for the Detroit Sulphite Pulp & Paper Company, Jack Campbell was fatally injured on June 18 as a result of an automobile accident near Wayne, Michigan.

Mr. Campbell, who had been with the Detroit firm for approximately five years, had attended the University of Michigan re-union at Ann Arbor on June 17 and was returning home when the accident occurred. Mr. Campbell was unmarried and is survived by his parents.

◆

EDWIN M. CHASE

Formerly manager of the Riverside Paper Company of Holyoke and also formerly associated with the Hampshire Paper Company of South Hadley Falls, Mass., Edwin M. Chase, 70, passed away June 12 after a prolonged illness. A native of Holyoke, Mr. Chase entered the employ of the Riverside concern and when that firm joined the American Writing Paper Corporation, he was appointed manager. He served in this capacity for many years. In 1918 he joined the Hampshire Paper Company remaining there until his retirement. Funeral services were held in Holyoke.

◆

▸▸▸ A member of the Canadian Parliament and formerly president of the Brompton Pulp and Paper Company, *Senator E. W. Tobin,* passed away suddenly at the age of 72. Through the Brompton company he played a prominent part in building up Canada's newsprint exports and had played an active part in federal affairs since 1900 when he was first elected to Parliament.

You are paying for this advanced "steam fit"— *why not HAVE it!*

YOU are paying in wasted time — time spent in repacking, adjusting and oiling. And you are paying in wasted power and rapid deterioration of your old-time steam fits.

Johnson Rotary Pressure Joints have no packing of any kind. The two special carbon graphite rings which form the bearings and pressure seal are *self-lubricating*. Sealed by the pressure, they are also *self-adjusting*. Equally important is the ball-and-socket design which compensates for angular misalignment and the annual space between the outlet and the housing which provides for lateral misalignment. These features combine to give the Johnson Joint many times the service life of former types.

There is a Johnson Joint for every type of machine with every kind of cylinder drainage.

Ask for complete description of this equipment.

Johnson Joints on a corrugator. Johnson Joints are now standard equipment on practically all such machines made.

THE JOHNSON CORPORATION
845 WOOD STREET — THREE RIVERS, MICH.

PAPER MILL
WOOD ▼ METAL ▼ RUBBER
"*Shaf-Tite*" Rolls

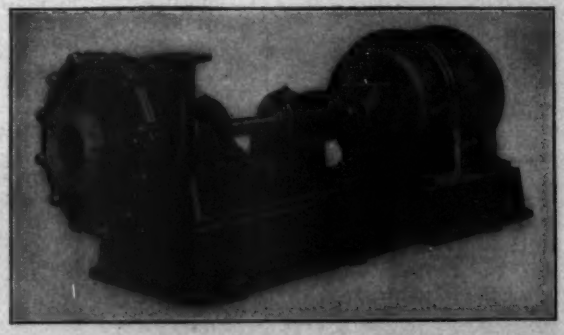
WATER TURBINES
CANAL GATES
GATE HOISTS
VARIABLE SPEED DRIVES
TANKS, VATS, ETC.
ENDLESS FELT WASHERS

RODNEY HUNT MACHINE CO.
38 Maple Street, Orange, Mass.

PUMPS THAT PAY PROFITS

When you put your pumping problem up to us, we'll quote you on a pump specially designed and built to meet your conditions and to pay you, in savings, good profits on your investment. We are pump engineers primarily—pump builders secondarily. Each LAWRENCE PUMP must maintain this company's record and reputation that has stood for 75 years. Let us work with you.

LAWRENCE MACHINE and PUMP CORP'N
367 Market Street — LAWRENCE, MASS.

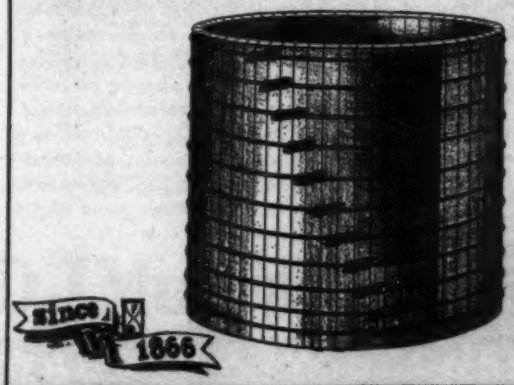


LAWRENCE CENTRIFUGAL PUMPS

Pulp and Paper Mill Screens

of STAINLESS STEEL—COPPER—BRONZE—MONEL—CHEMICAL RESISTING ALLOYS
Perforations that are accurate in size and alignment
ANY METAL •• ANY PERFORATION

The Harrington & King PERFORATING CO.
5654 Fillmore St., Chicago, Ill., ◆114 Liberty St., New York, N.Y.



. . . FOR DEPENDABLE WOODEN TANKS

The experience of Dunck designers and craftsmen, dating back over 70 years, is available to you . . . . for practical advice and dependable service on any tank problem.

DUNCK TANK WORKS, INC.
2425 No. 30th Street — Milwaukee, Wis.

DUNCK'S *Superior* WOODEN TANKS

CURRENT MARKET QUOTATIONS

RAGS (Domestic)
f. o. b. New York City

NEW RAGS — per cwt.

Blue Overalls	4.75 to 5.00
Corduroy	2.00 to 2.25
Cottons—	
Washables, No. 1	1.50 to 1.75
Fancy Percales	3.00 to 3.25
New Soft Blacks	3.00 to 3.26
New Light Seconds	1.65 to 1.75
New Dark Seconds	1.50 to 1.60
Khaki Cuttings—	
Mixed	3.25 to 3.50
O. D.	3.75 to 4.00
New Canvas	7.00 to 7.25
New Mixed Blacks	2.25 to 2.50
Shirt Cuttings—	
New White No. 1	6.25 to 6.50
Silesias No. 1	3.75 to 4.00
New Unbleached	5.75 to 6.00
Fancy	2.25 to 2.50

RAGS (Domestic)
f. o. b. New York City

OLD RAGS

	per cwt.
Roofing—	
No. 1	1.00 to 1.05
No. 2	.70 to .75
No. 3	.60 to .65
Twos and Blues—	
Repacked	1.50 to 1.60
Thirds and Blues—	
Repacked	1.30 to 1.40
Miscellaneous	1.05 to 1.15
White, No. 1—	
Repacked	3.25 to 3.50
Miscellaneous	2.75 to 3.00
White, No. 2—	
Repacked	2.25 to 2.50
Miscellaneous	1.75 to 2.00

RAGS (Foreign)
ex dock New York City

NEW RAGS — per cwt.

New Dark Cuttings	2.25 to 2.50
New Mixed Cuttings	2.00 to 2.25
New Light Silesias	4.25 to 4.50
Light Flannelettes	4.50 to 4.75
Unbleached Cuttings	6.00 to 6.25
New White Cuttings	6.75 to 7.00
New Light Oxfords	3.50 to 3.75
New Light Prints	2.75 to 3.00

RAGS (Foreign)
ex dock New York City

OLD RAGS — per cwt.

No. 1 White Linens	7.00 to 7.25
No. 2 White Linens	6.00 to 6.25
No. 3 White Linens	5.00 to 5.25
No. 4 White Linens	3.50 to 3.75
No. 1 White Cottons	4.00 to 4.25
No. 2 White Cottons	3.25 to 3.50
No. 3 White Cottons	2.50 to 2.75
No. 4 White Cottons	2.00 to 2.25
Extra Light Prints	2.50 to 2.75
Ord. Light Prints	2.00 to 2.25
Med. Light Prints	1.75 to 2.00
Dutch Blue Cottons	2.00 to 2.25
French Blue Cottons	2.10 to 2.30
French Blue Linens	2.75 to 3.00
Checks and Blues	1.75 to 2.00
Linsey Garments	1.40 to 1.50
Dark Cottons	1.05 to 1.15
Old Shapperies	.95 to 1.05

ROPE and BAGGING
f. o. b. and ex dock New York City

	per cwt.
Gunny No. 1—	
Foreign	2.25 to 2.35
Domestic	2.15 to 2.25
Wool Tares—	
Light	1.60 to 1.70
Heavy	1.80 to 1.90
Bright Bagging	1.40 to 1.50
Manila Rope—	
Foreign	2.50 to 2.75
Domestic	2.50 to 2.75
New Burlap Cuttings	2.15 to 2.25
Jute Threads—	
Foreign	2.50 to 2.75
Domestic	2.75 to 3.00
Strings—	
Sisal	1.40 to 1.50
Soft jute	1.50 to 1.60
Mixed	.40 to .50

WASTE PAPER
f. o. b. New York City

	per cwt.
Shavings—	
White Envp. Cuttings	2.25 to 2.40
Ord. Hard White No. 1	1.75 to 2.00
Ord. Soft White No. 1	1.65 to 1.75
Flat Stock—	
Stitchless	.65 to .70
Overissue Mags.	.55 to .60
Solid Flat Book	.40 to .45
Crumpled No. 1	.30 to .35
Solid Ledger Books	1.30 to 1.40
Ledger Stock—	
White	.90 to .95
Colored	.50 to .55
New B. B. Chips	.12½ to .15
Manilas—	
New Env. Cuts	1.35 to 1.45
New Cuttings	1.15 to 1.25
Bogus Wrappers	.12½ to .15
No. 1 Old Kraft	.50 to .60
News—	
No. 1 Wh. News Cuttings	1.25 to 1.30
Strictly Overissue	.35 to .40
Strictly Folded	.25 to .30
No. 1 Mixed Paper	.10 to .12½

CHEMICALS
f. o. b. shipping point

Alum (Papermakers)—	
Lump, cwt.	3.40 -
Ground, cwt.	3.15 -
Powdered, cwt.	3.55 -
Blanc Fixe—	
Bulk, ton	40.00 to 42.50
Barrels, pound	.0325 to .035
Bleaching Powder—	
Drums, cwt.	2.00 to 2.25
Casein (Domestic Standard)—	
Ground (bags), lb.	.075 to .08
Fine grd. (bags), lb.	.08 to .085
China Clay—	
Domestic Filler	
Bulk (mine) ton	6.50 to 12.00
Domestic Coating	
Bulk (mine) ton	11.00 to 20.00
Imported (ship side)	
Bulk (lump) ton	14.50 to 24.00
Chlorine—	
Tank cars (wks) cwt.	2.15 to 2.55
Gelatine (silicin) lb.	.0475 to .05
Glye. (C.P.) drums, lb.	.1425 to .1475
Litharge, bbl., lb.	.0625 to .065
Rosin (Gum)—	
Savannah, 280 lb. barrel	
E, per bbl.	5.40
F, per bbl.	5.80
G, per bbl.	6.15
WW, per bbl.	7.55
Rosin (Wood), per bbl.	5.05
Salt Cake—	
Dom. bulk (wks) ton	13.00 to 15.00
Imp. bulk on dock—	
(Atl. ports) ton	14.50 to 15.00
Soda Ash—	
Bulk (works) cwt.	.90 to .95
Paper Bags, cwt.	1.05 -
Barrels, cwt.	1.35 -
Soda (Caustic)—	
Solid, drums, cwt.	2.15 to 2.30
Ground and flake, drums, cwt.	2.60 to 2.70
Sodium Silicate—	
60 deg., 55 gal. drums, (works) cwt.	1.65 to 2.00
40 deg., 55 gal. drums, (works) cwt.	.80 to 1.20
Starch—	
Pearl, 140 lb. bags, cwt.	2.60 -
Pearl, barrels, cwt.	2.85 -
Paper (Sp.) bags, cwt.	2.70 -
barrels, cwt.	2.95 -
Sulphur (crude)—	
(mine) bulk, ton	18.00 to 21.00
Talc—	
Dom. 100 lb. bags (mine) ton	15.00 to 18.00
Imp. bulk, ton	25.00 to 40.00
Titanium Dioxide—	
Ba. Pig., bbls., lb.	.06¾ to .06¼
Ca. Pig., bbls., lb.	.05½ to .06¼
Zinc Sulphide, bbls., lb.	.09 to .095

CHEMICAL PULP
(Air-dry ton)

	per cwt.
Soda (Dom.) del'd. mill—	
Bleached	2.70 -
Sulphate (Dom.) f. o. b. mill—	
Bleached	2.75 to 3.00
Kraft No. 1	2.00 to 2.25
Kraft No. 2	1.75 to 1.90
Sulphate (Imp.) on dock—	
Bleached	2.75 to 3.00
Kraft No. 1	1.85 to 2.00
Kraft No. 2	1.65 to 1.80
Sulphite (Dom. & For.) On dock—	
Prime bleached	2.75 to 3.00
Prime easy bleach	2.25 to 2.50
Prime strong unbl.	2.00 to 2.35

MECHANICAL PULP
(Air-dry ton)

	per ton
No. 1 Dom. & Can. (f. o. b. mill)	19.00 to 22.00
No. 1 Imp. (On dock)—	
Moist	26.00 to 27.00
Dry	25.00 to 26.00

PAPER
f. o. b. New York City

	per ton
Boards—	
Binders	71.00 to 75.00
Chip	25.00 -
Chip, sgl. mla. lined	40.00 to 45.00
Coated, white patent .010	60.00 to 65.00
.020 and heavier	55.00 to 60.00
Kraft liner	50.00 to 52.50
News	25.00 -

	per cwt.
Book (easel)—	
No. 1 Glossy Coat	10.50 to 14.25
No. 2 Glossy Coat	9.50 to 12.25
No. 3 Glossy Coat	8.25 to 11.00
No. 4 Glossy Coat	7.70 to 10.50
No. 1 Antique	8.80 to 10.50
No. 2 Offset	7.10 to 9.50
A Grade E. F.	8.90 to 9.50
A Grade Super	7.15 to 9.75
B Grade E. F.	6.40 to 8.75
B Grade Super	6.65 to 9.00
C Grade E. F.	6.10 to 8.50
C Grade Super	6.35 to 8.75
D Grade E. F.	5.85 to 8.25
D Grade Super	6.10 to 8.50
Ivory & India	.50 cwt. extra
Bonds (Rag Content)—	
100% Rag	
Ext. No. 1	39.10 to 46.00
100% Rag	31.05 to 36.50
85% Rag	
75% Rag	23.60 to 27.75
65% Rag	20.50 to 25.00
50% Rag	17.75 to 21.50
25% Rag	14.65 to 17.75
Regular Colors	1.00 cwt. extra
Heavy Colors	3.00 cwt. extra
Bonds (Sulphite)—	
No. 1	8.80 to 10.75
No. 2	7.90 to 9.50
No. 4	7.00 to 8.50
Colors	1.00 cwt. extra
Glassine (f. o. b. mill)—	
Embossed (25 lb. up)	12.25 -
Bleached (25 lb. up)	11.25 -
Unbleach (25 lb. up)	9.50 -
Greaseproof—	
Bleach. (25 lb. up)	9.20 -
Unbleach. (25 lb. up)	8.75 -
Ledgers (Rag Content)—	
100% Rag	
Ext. No. 1	40.25 to 47.25
100% Rag	32.20 to 37.75
85% Rag	29.50 to 35.00
75% Rag	24.75 to 29.00
65% Rag	21.65 to 26.25
50% Rag	18.70 to 22.75
25% Rag	15.80 to 19.25
Regular Colors	1.00 cwt. extra
Heavy Colors	3.00 cwt. extra
Ledgers (Sulphite)—	
No. 1	9.95 to 12.00
No. 2	9.05 to 11.00
No. 4	8.20 to 10.00

	per ton
News—	
Rolls (Contract)	50.00 -
Rolls (Spot)	(nominal)
Sheets	58.00 -

	per ream
Tissues (Carlots)—	
Anti-Tarnish M. G.	.75 -
Colored	.875 -
Kraft	.75 -
Manila	.60 -
Napkins, semi-crepe (12½ lb. to M shts.) per cs.	.46 -
Napkins, full crepe and emb'sed (12½ lb. to M shts.) per cs.	.52 -
Toilet, Bleached (M shts.) per cs.	4.40 to 5.80
Toilet, Unbleached (M shts.) per cs.	2.75 to 3.90

	per case
Towels—	
Bleached	3.10 to 3.65
Unbleached	1.80 to 3.30

	per cwt.
Wrappings (Kraft)—	
Extra Quality	5.00 to 5.50
Super-Standard	4.75 to 5.00
Northern Standard	4.35 to 4.50
Southern Standard	4.00 to 4.25
Wrappings (Sulphite and Bleached Kraft)— (Rolls, f. o. b. mill)	
Bleached papers—	
M.F. & M.G. Waxing, 20 lb. (Carloads only)	5.75 -
(10,000 lbs.)	6.00 -
Drug wrapp. 35 lb.	5.35 -
Unbleached Papers—	
Com. Grd. Butch. 40 lb.	4.25 -
No. 1 Butchers	4.50 -
No. 1 Imit. Parch & Dry Fin. Groc. Sulphite 30 lb.	4.625 -
No. 2 Imit. Parch & Dry Fin. Groc. Sulphite 30 lb.	4.375 -
Steam Finish, 50 lb.	3.625 -
Water Finish, 40 lb.	4.25 -
Manilas—	
Envp. Mla., Sub. 16-40 (No. 1)	5.25 -
Envp. Mla., Sub. 16-28 (No. 2)	5.00 -
Envp. Mla. (Prices based on large sheets untrim'd ream-marked, in bdls.)	
Wrapp. Mla. 35 lb. up—	
No. 1	5.00 -
No. 2	4.75 -
M. G. Sulphite (other than Waxing)	
Grade A-25 lb.	5.25 -
Grade B-25 lb.	5.00 -

CLAYS

IMPORTED DOMESTIC

PAPER MAKERS IMPORTING CO. INC. BOSTON, PENNSYLVANIA, U.S.A.

DOMESTIC—TALC AND WHITING

For Sale—Paper Machinery

Paper Machines: 72 in., 126 in.
Experimental Fourdrinier Paper Machine with wire 46 in. by 50 ft., 2 presses, Minton vacuum dryer, worn gear drive.
Calender Stacks: 116 in., 114 in., 104 in., 100 in., 90 in., 88 in., 84 in., 76 in.
Super Calenders: 44 in., 72 in., motor driven.
Sheet Cutters: 72 in., 94 in., 108 in., 136 in., duplex with or without layboys; single: 44 in. to 100 in. (20 cutters and layboys).
Slitters: 60 in. Cameron. 60 in. Kidder.
Trimmers: 2-50 in. Seybold.
Dryers: Several hundred, from 42 in. to 100 in. face.
Fourdrinier Part: Late type, Moore & White, takes wire 80 in. by 50 ft., with Voith inlet and suction couch.
Jordans: 3 Jones, 2 Emersons, 2 Appleton.

BEATERS—PUMPS—ROLLS—REEVES DRIVES

Write to us when you want to sell Paper Mill Machinery

FRANK H. DAVIS CO.
175 Richdale Avenue, Cambridge, Massachusetts

Whirlflex

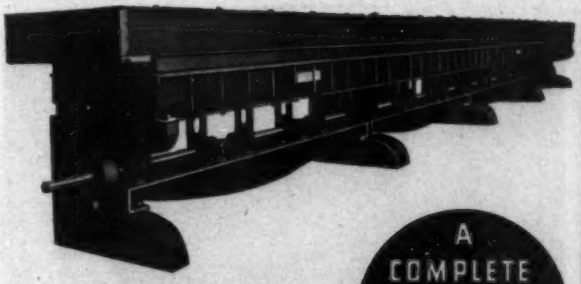
THE 100% MECHANICAL PIPE CLEANER

Designed to meet YOUR problems

OWNERS HAVE PROVED OUR CLAIMS
WE GUARANTEE THEM

It will PAY you to investigate
PAT. IN U.S.A. and CANADA

801 White Bldg. Buffalo, N. Y.



A COMPLETE LINE OF FLAT SCREENS

This New Murray Flat Screen is equipped with a special drive developed to meet exacting and heavy duty requirements with high speed. A modern equipment for the mill that must improve quality and cut operation costs to meet all competition. Quiet in operation. Efficient, these screens will do a better job of cleaning your pulp. No vibration, no pounding, no clatter. Highest efficiency, with lowest maintenance and lowest power costs. This drive can also be installed on your present screens. Write for prices on screens you require to modernize your mill. Remember, we make all sizes and types of construction to fit every requirement.

D. J. Murray Mfg. Co.
WAUSAU ~ WISCONSIN.

CLEANING SAVE-ALLS THE OAKITE WAY

"best job we have ever seen"

STILL another engineer reports Oakite cleaning best for reconditioning dirty save-alls.

In this particular plant, there are four units . . . all of the largest size made. Cleaning such huge equipment is a big job . . . and a tough one, too, for the wires are often clogged with pitch as well as slime.

Yet an Oakite solution, applied with an Oakite steam gun not only cleans thoroughly, but does the job in 40% less time.

Wouldn't you like full information on this modern quicker way to clean save-alls?

Manufactured only by
OAKITE PRODUCTS, INC., 16 Thames St., NEW YORK
Branch Offices and Representatives in All Principal Cities of the U. S.

OAKITE *Certified* CLEANING

Fast and Uniform Drying WITH

Precision Dryer Felts

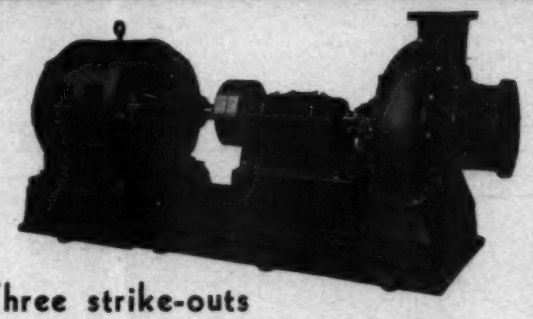
It is not only essential that dryer felts dry quickly, they must also dry uniformly if the finest quality of paper is to be expected . . . maximum speeds maintained . . . and steam consumption kept at a minimum.

RICHLAND TRIPLEX all cotton and asbestos felts are fast drying felts. They also dry with a high degree of uniformity because they are woven on the finest modern looms to rigid standards of tolerance. They are really precision fabrics. Specify RICHLAND TRIPLEX. Under comparable conditions of operation they will give you higher efficiency and longer wear.

MT. VERNON-WOODBERRY MILLS, INC.
TURNER HALSEY COMPANY
40 WORTH STREET *Selling Agents* NEW YORK CITY

The MORRIS HYDRAULIC COLUMN

News of interest to Centrifugal Pump Users



Three strike-outs and then Morris came to bat . . .

It wasn't a ball game, but Morris certainly made a hit. Three other pump manufacturers one after another gave up the job of trying to design a non-clogging pump that would meet required efficiencies at two different conditions of capacity, head, and speed. The pumps designed by Morris did meet the guarantees, and passed the acceptance test with flying colors. More and more, engineers are learning to come to Morris for all their pumping requirements, standard or special.

A millful of Morris . . . .

Many a mill uses Morris—for pumping clear and white water, thick and thin stock, for chemicals, boiler feed, general service and fire protection. Are you having trouble with your present pumps? Ask Morris about their special purpose pumps. Do you want higher efficiencies? Ask Morris about their guarantees. Do your present pumps wear out unduly fast? Ask Morris about their special wear-resisting alloys. Are you considering the purchase of new pumping equipment? Be sure to get a Morris quotation before you decide. The Morris bulletin on pumps for paper and pulp mills will interest every plant engineer. Copies sent on request.

For authoritative recommendations on any pumping problem, write to Morris Machine Works, Baldwinsville, N. Y. Representatives in principal cities.

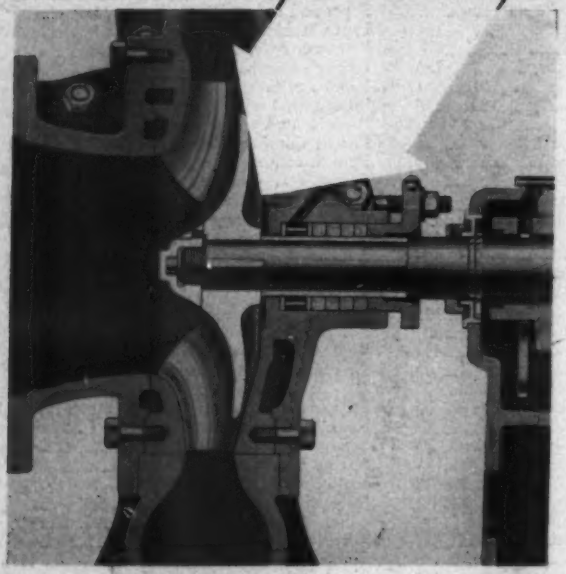
INDEX TO ADVERTISERS

When writing them, please mention The Paper Industry and Paper World

Allington & Curtis Mfg. Co. 469
Allis-Chalmers Mfg. Co. 363
American Chain & Cable Co. 451, 477
American Engineering Co. 399
American Paper Machy. & Eng. Wks. 455
American Rolling Mill Co. 471
Appleton Wire Works, Inc. 473
Appleton Woolen Mills 400
Armstrong Machine Works
Asten-Hill Mfg. Co. 459
Automatic Transportation Co.
Bagley & Sewall Co. 427
Bailey Meter Company
Bauer Brothers Co., The
Beloit Iron Works 355
Bird Machine Company
Black-Clawson Co. 373
Black-Ray Lighting Co. 443
Bolton & Sons, Inc., John W. 496
Boston Woven Hose & Rubber Co. 356-357
Bowser & Co., Inc., S. F.
Bowsher Co., The N. P. 485
Brown Instrument Co., The
Buffalo Pumps, Inc. 449
Bulkley, Dunton & Co. 473
Cambridge Instrument Co., Inc. 473
Cameron Machine Co.
Carthage Machine Co.
Chain Belt Company
Chemical Construction Corporation
Chemical Lining Engineers, Inc. 469
Chemipulp Process, Inc. 389
Chicago Bridge & Iron Company 462
Chicago Electric Company 485
Chromium Corp. of America 453
Classified Advertising
Cleveland Tramrail 484
Cochrane Corporation
Coes Company, Loring 487
Columbia Alkali Corp., The 362
Cooper Alloy Foundry Co.
Corning Glass Works
Covel-Hanchett Company 463
Davis Co., Frank H. 493
Dayton Rubber Mfg. Co.
De Laval Steam Turbine Co.
DeZurik Shower Company
Dilts Machine Works, Inc. 401
Downingtown Mfg. Co. 1st Cover
Draper Bros. Co. 466
Dunck Tank Works, Inc. 491
Duriron Company, Inc., The
Eastwood-Nealley Corporation 385
Eimco Corporation, The 381
Elixman Paper Core Co., Inc. 463
Emerson Manufacturing Co. 496
English China Clays Sales Corp. 477
Ferguson & Co., Hardy S. 469
Ferguson Engineers 477
Fibre Making Processes, Inc.
Flexrock Company
Foote Bros. Gear & Machine Corp.
Foster Wheeler Corporation
Frederick Iron & Steel Co. 475
Garlock Packing Co., The
Gates Rubber Co. 390
General Chemical Co.
General Coal Company
General Electric Co. 391
Gifford-Wood Co.
Glens Falls Machine Works, Inc. 455
Goulds Pumps, Inc. 431
Graver Tank & Mfg. Co., Inc. 436
Green, Arthur B.
Grinnell Co., Inc., The
Hardy, George F. 469
Harper Co., The H. M.
Harrington & King Perforating Co. 491
Harris-Seybold-Potter Co. 358
Hauser-Stander Tank Co. 461
Hercules Powder Co., PMC Div. 384
Hewitt Machine Co., J. W. 485
Hooker Electrochemical Co. 475
Hooper & Sons Co., Wm. F. 388
Hudson-Sharp Machine Co. 487
Hunt Machine Co., Rodney 491
Huyck & Sons, F. C.
Hyatt Bearings Div., GMC
Improved Paper Mach'y Corp.
Ingersoll-Rand Co.
International Nickel Co., Inc.
Jeffrey Mfg. Co., The
Johnson Corporation, The 491
Jones & Sons Co., E. D.
Kalamazoo Tank & Silo Co. 433
Kalamazoo Vegetable Parchment Co. 467
Knight, Maurice A. 478
Koppers Company 365
Krebs Pigment & Color Corp. 433
Langston Co., Samuel M. 3rd Cover
Lawrence Machine & Pump Corp. 491
Layne & Bowler, Inc.
Lewellen Manufacturing Co. 398
Lindsay Wire Weaving Co., The 459
Link-Belt Company 395
Littleford Brothers 453
Lockport Felt Co. 487
Love Brothers, Inc.
Lunkenheimer Co., The 437
Magnus Chemical Company 481
Mason-Neilan Regulator Co. 435
Mathieson Alkali Works, Inc. 392
Merritt-Chapman & Scott Corp.
Michigan Steel Casting Co. 489
Midwest-Fulton Machine Co. 475
Morris Machine Works 494
Morse Chain Company
Murray Mfg. Co., D. J. 493
Nash Engineering Co., The 461
National Lead Company 364
National Oil Products Co. 477
National Safety Council 470
Naylor Pipe Company 480
New England Tank & Tower Co. 447
Nitrose Company, Inc., The 447
Norma-Hoffmann Bearings Corp.
Norton Company 439
Norwood Engineering Co., The 439
Oakite Products, Inc. 493
Oliver United Filters, Inc.
Orr Felt & Blanket Co., The 443
Paper and Industrial Appliances, Inc.
Paper Makers Importing Co., Inc. 493
Patterson Fdry. & Mach. Co.
Pennsylvania Salt Mfg. Co.
Perkins & Son, Inc., B. F. 445
Pittsburgh Piping & Equipment Co.
Poole Foundry & Machine Co. 437
Powell Company, The Wm. 396
Pulp Bleaching Company 483
Pure Oil Company, The
Pusey & Jones Corp., The 387
Quigley Company, Inc.
Record Foundry & Machine Co. 483
Reliance Electric & Engrg. Co.
Robins Conveying Belt Co.
Rockwood Mfg. Co., The 2nd Cover
Rogers & Co., Samuel C.
Rollway Bearing Co., Inc. 397
Roots-Connersville Blower Corp. 469
Ross Engineering Corp., J. O. 441
Rust Engineering Co., The 469
Ryerson & Son, Inc., Jos. T. 402, 447
Sandusky Foundry & Machine Co. 455
Sandy Hill Iron & Brass Works 421-424
Shartle Bros. Machine Co. 373
Shell Union Oil Corp.
Shepard Niles Crane & Hoist Corp.
Shuler & Benninghofen 386
Silco Pulp Products Co., The
Simonds Saw and Steel Co. 457
Simonds Worden White Co.
S K F Industries, Inc. 367
Smith & Winchester Mfg. Co. 377
Solvay Sales Corporation 461
Standard Oil Co. (Ind.) 4th Cover
Stanley Works, The 451
Stebbins Engrg. & Mfg. Co. 375
Stewart & Company, James
Stickle Steam Specialties Co. 477
Taylor Forge & Pipe Works 479
Taylor Instrument Companies
Texas Company, The 360-361
Textile-Finishing Machinery Co.
Timken Roller Bearing Co. 429
Titanium Pigment Corporation 383
Trimbey Machine Works 489
Turner Halsey Company 494
United Carbon Company 477
United States Rubber Co.
Vanderbilt Co., Inc., R. T.
Warren Steam Pump Co., Inc. 496
Waterbury & Sons Co., H. 475
Waterbury Felt Co. 477
Westinghouse Electric & Mfg. Co.
Weyerhaeuser Timber Co. 366
Whirlflex Sales, Inc. 493
Wiener Refiner Engineering Co. 485
Wilkens-Anderson Company
Worthington Pump & Machy. Corp.
Wright Manufacturing Division 451
Yale & Towne Mfg. Co., The 457

Refer to the PAPER and PULP MILL CATALOGUE for complete listing of all advertisers' products. The new 1938 edition may be seen at your mill office.

HOW CLOGGING IS PREVENTED



IN WARREN STOCK PUMPS...

It's a matter of plain, provable fact that Warren self-cleaning, non-binding impellers keep heavy stock on the go—year in and year out—prevent shutdowns—save maintenance.

Special vanes keep stock from working behind the impeller and jamming the pump—an exclusive Warren feature that's saved money for many a mill.

Add this to the many other time-proved Warren features: large inlets, properly proportioned liquid passages, extra heavy shafts that prevent vibration, over-size bearings that keep down wear—and you have the best guarantee of long-term, trouble-free service.

Your Warren representative will be glad to prepare recommendations on your requirements. Perhaps he can suggest a money-saving replacement.

WARREN PUMPS

WARREN STEAM PUMP CO., Incorporated

WARREN, MASSACHUSETTS, U. S. A.

THE BOLTON WEDGELESS PLUG

Inverted Woods

Can't work loose

No Rings

Knives Locked in Milled Slots

Takes Any Size Knife

EMERSON MANUFACTURING CO.

Division of JOHN W. BOLTON & SONS, INC.

LAWRENCE, MASS.